
FIELD BOOK

364

JAMES E. KE.

KEUFFEL & ESSER CO.

DRAWING MATERIALS

AND

SURVEYING INSTRUMENTS.

NEW YORK.

CHICAGO. ST. LOUIS. SAN FRANCISCO. MONTREAL.

Tables for Excavations and Embankments.

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

ROADWAY 18 FEET WIDE. SIDE SLOPES 1 TO 1.

FOR SINGLE TRACK EXCAVATION.

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	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	0
1	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	1
2	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	2
3	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	3
4	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	4
5	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	5
6	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	6
7	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	7
8	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	8
9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	9
10	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	10
11	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	11
12	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	12
13	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	13
14	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	14
15	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	15
16	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	16
17	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	17
18	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	18
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26	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	26
27	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	27
28	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	28
29	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	29
30	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	30
31	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	31
32	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	32
33	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	33
34	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	34
35	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	35
36	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	36

Calculated by Julien A. Hall, M. Am. Soc. C. E.

FOR KEITH'S RAILROAD CURVE TABLES SEE END OF BOOK.

Bird Record of

MRS. JAMES W. EIKE
6207 NEWMAN ROAD
FAIRFAX, VA.
22030



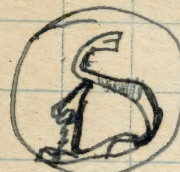
9-15-84
V.S.O.
These are the oldest records.
Jim entered Georgetown Univ
Fall of 1928. Graduated 1932.
These notes were made in the
Woodbridge area - most in
the former lead woods (40+ acres)
the street is now called Armistead⁵⁺
Clair

2.

16 ga. GUN. MANFD. BY MERIDEN ARMS CO.
MERIDEN, CT, PATD. JULY 9, 1907.
NO. ON FORE PLATE 71142

BELOW FIRING PINS -- RIGHT SIDE - 19
LEFT SIDE - 530 - 71142

22 CAL. ^{LONG} RIFLE - SINGLE SHOT - GERMAN MAKE
DEUTSCHE WERKE - WERKE ERFURT.
RIGHT SIDE - BELOW SIGHT - DRP GERMANY.



ON TOP OF BARREL

MOD
I

UNDER BARREL 20^{mm} 5.4 MM
3541 V

22 CAL. SHORT-REPEATING RIFLE
MAD. BY WINCHESTER ARMS CO.
NEW HAVEN, CONN. U.S.A. PATENTED June 11, '88
DEC. 6, '92 -- MOD. 1906 --

ON SIGHT PAT. JAN. 29, 1901
ON STOCK - BACK of HAMMER -
WINCHESTER.
TRADE MARK.

3.

UNDERBARREL - 4
23

59

IN FRONT OF TRIGGER GUARD - 2945
" BACK " " " 29415



FALL 1926 - 16 squirrels
3 quail

Summer (middle of June to
end of July)

1928 - my first 17 year locust year.
Obey, the third of a lifetime! Countless
(11/28/28) millions of soft, white bugs crawling
on everything in sight, then just as
many dry shells everywhere, and
lastly, that steady, monotonous,
droning whine, filling the whole universe.
Whoopie! And what wrecks they made of
every tree & bush in sight. (Except fruit trees & cacti)

4. 1928
Aug 12 - 1928

FALL & WINTER - 1927-28 - 68 squirrels

(MARSH)

MARCH 1928 - RABBIT HAWK - 4 FT. WING
SPREAD - KILLED AT 83 YDS. 2 FT. - ACTUAL
measure - 16 ga. gun - C/M max shell -
no. 4 shot - 2 1/2 dr. - Horner's field

Spring 1928 -

Pair of East. Orioles arrived -
First in no. of years - nest un-
discovered - birds constantly in
& around garden - followed father bird
on one of many trips to pines at Carl's
pig-pen - Found one young male & 2
females - large - were near house for
next few days, then disappeared -
Visited once or twice on rainy days -
Once in late July all 5 returned and
destroyed 3 large nests of small green
tent caterpillars in mulb. tree & gooseberry
bushes - Gone again.

Aug. 12 - 1928 - Killed 8th snake of season,
6 ft. black - 5 water moccasins - 1 large

5

8/27/29
(copper head).

and mooseassin - and 2 six ft. black-
or "blue racers"

- 1927 Record - 13 snakes - only
one escaped in maconodgys
cove.

- Thus far (until Aug. 8) 4 have
escaped - one badly crippled.

Indigo Bunting - first observed
about 3 yrs. ago at Kay's. - nest
this yr. (1928) on path to road -
didn't find nest for fear of
frightening shy bird - daily,
starting at ft. of hill by dead tree,
fluttered ahead, chirping, to top
of hill, where he would fly out into
the field.

Bunting unseen for about
2 wks. - reappeared about end
of July - singing happily.

Children raised & worries of father-
hood all over, I expect. Good cause to
be happy!

We have 8 fine chicks which

hens brot in - 9th. one died, - we
had decided not to raise any this
yr. too. Oh well.

Aug. 12 - 2:50 P.M.

Started raining Fri. - 3 O'clock & still
is - peach tree limb split off - sun-
flower stalk broken - corn beaten down.

Aug. 18 - Rain - Orioles have come to stay.

Bought Box X-perts - Killed Coopers hawk
in Castle Woods - about 40 yds. Caught snap-
ping turtle in mud of marsh. Killed young
rabbit in garden with 22.

Aug. 19. Almost scored double on 2 hawks
about 3' apart. Saw one in back crumple,
& shot first one, he began to fall also,
then both straightened out & sailed
away. One first shot fell in Bubb's woods.
Shot from kitchen door to top of hill.

Sept. 1, 1929 - 1 squirrel

Sept - 1 water snake back under falls
Total 9 to date.

Total 10

Oct. - (13 or 20) - Killed large black snake on path.

Oct. 22, 1929 - Crippled squirrel in gum tree.
Habit.

Trapped one hawk on chicken.

Nov. 1. Watched a little sparrow, one
of several that have been
singing for some days.

Song: high-pitched, clear tweet
see, see-e-e, see, see, see
or shée, shér, shér.

Description: Upper back - red
brown, like Engl. sparrows.

Stomach - greyish white.

Reddish brown or black
line on each side of
a white line thru center
of head, from bill back
to neck.

On each cheek is a
light whitish ^{yellow} patch, with
lemon-yellow patches in
front, deepest yellow near
the bill, and very pale near
eyes. White under throat,
with black, thin line collar
around throat. Bill short,
not heavy; thin.

First seen in pine trees
singing, and today was sitting
in an oak, from there flew
down into a pine brush pile,
and soon up into a small
pine.

Black line back from eye on
^(or brown) each side

About size of Eng. sparrow.

Plump.

White bar ^(or two) on wings. The
back is a clear red-brown,
in most cases not mottled.

↑
White-throated Sparrow.

About 9 P.M.,
Brooks & Mary
here

Nov. 28, 1928. Identified Carolina wrens today. Flocks of them along path to Maconaugley's, in brush piles in woods & in field. These have been living here for years. I've also seen long & short-billed marsh wrens in marsh by pond, and house wren & winter wren are yearly residents. The house wrens have nested here every year since "way back when." There is another set of wrens that frequent Bobb's branch, and who sing beautifully, in a voice out of all proportion to their size, very rich & melodious. These are either Carolina or long-billed marsh wrens.

Another newly-found friend this year is the redstart. He got many a good meal out of the wisteria & the wild-cherry trees in front of the house.

Thought I saw an orchard oriole this year but not sure. However I saw a summer tanager many times (much as we can).

I have taken especial notice this year of the large flocks of tree birds, traveling around in the woods. What a system they have! From the little downy woodpecker, down thru all the warblers, nuthatches, creepers, etc. the trees are covered by these bands. Each has his special types of work to do, and they sweep rapidly thru the woods, cleaning out the insects as they go. They have a regular route each time, and return at regular intervals. Many of them were old friends, known or unknown, but many I did not remember seeing before.

One was either a blackpoll warbler or a black & white creeper. He was in a flock I saw in mid-summer, while waiting for a hawk.

Jan. 6, 1929 Went out with dogs on
Sat., Dec. 1, 1928; killed rabbit
in bed by big dead tree near pond;
waited at falls' cross roads
while dogs hunted in thickets,
then went up road. The puppy
soon came out & was trailing
around. Teddy picked up the
trail & dashed off across the woods,
trailing silent. The puppy followed
real slow, and I hunted the
brush piles. Teddy started
barking way off as tho he
was barking at a man. I went
on over, getting there about 10
min. later. I broke thru the
rim of woods into a clearing of
small trees. Teddy whined
around on his hind legs, barking
when he saw me. A big red fox
was facing him across a fallen
log. When he saw me he darted
away, and I slipped up the gun
& shot, just as Teddy closed in
& jumped on him. He shook

Teddy off and ran away at right
angles to my left, loping
along. The first shot at about
35 yds. tore the muscle of
his st. hind leg. Teddy ran
him down just as he was
about to pass thru the small
trees into the thick bushes. He
faced around, about 40 yds.
away, his right side to
me, his head behind a
6 inch tree, facing Teddy; I pulled
the right barrel of the 16 ga.
and he flopped over. Teddy
sprawled all over him
chewing at him, and I reloaded
as I ran up to pull Teddy off.
His front leg was broken
neatly at the upper joint, dis-
abling both right legs. I
carried him home and
measured him. "Reddy" was
four feet long (when stiff),
20 inches high at the front
shoulder, and weighed 11 lbs.

altho the scale is usually
off. His tail was 20" long,
and over 15" around at the
largest part. He was a
perfect specimen, deep
red, with black nose,
ears, and legs, and a white
tip on his dark tail. His ears
were deep black on the outside,
and snow-white inside.

When skinning Carl cut
off the lower part of his
legs, but Papa skinned him
& saved them. The fur companies
quote Red Fox as high as \$40.00,
Mrs. McKinnon offered to
pay me more than any fur
Co. for this or any other fox I
might get. Mary wants
him too.

That evening I went
out & killed another rabbit
Carl had crippled. Teddy
ran fine.

Since then I have

killed more rabbits having
about 10. also have 1 squirrel
and crippled another who got
in old gum. I've seen three (3).

For Christmas I received a
book of Bird, animal, & Insect
paintings, with descriptions, by
R. Bruce Horsfall & Cassa Horsfall,
and 13 (or rather 11) nature pictures
from Peggy; a rabbit picture
from Peggy (?), a picture "The Appeal
to the Spirit", a book on astronomy,
a cap, 2 scarves, 1 pr. of socks, 1 tie,
and 2 prs. of pajamas.

On Sat Dec 29, Mary brought
my pr. of 8x binoculars (Sumex
Paris) from Hecht's. I paid \$13.50
for them, reduced from \$25.00
I went down to the river and
watched a flock of chickadees.
In the pines on the path to the road
I found a flock of chickadees
& nuthatches. The nuthatches
were white-breasted, but seemed

as small as the rose-breasted
"dutch".

I've been reading lots of
animal stories in "American"
by A. P. Jerhume, & Archibald
Ruthledge.

1/19/29 - Saw 2 airplanes from Castle Woods.
1 biplane - C-1276, followed by
a cabin monoplane, tri-motored,
with long line of windows.

Watched sharp-shinned hawk.

This was on Jan. 5, 1929. Saturday.

1/19/29 - Saturday -

I was sitting out in the back
garden this morning, about 10:30,
listening to the blue-birds &
starlings singing, and the sparrows
chirping, and admiring the wonderful
"late spring" weather, when I heard
a wild canary sing. I looked around
and saw not only the little green
canary, but a bird which appeared to
be some thrush, or the no description
fits him. He flew from the fence
to one of the posts, posing beautifully,

then flew down on between the
celiac rows (where strawberries
were) and walked along, a few
inches behind the canary. I watched
him thru the binoculars, until
he flew over to the woods.

He was a dark rust-red on his
back, which had a sort of speckled,
sandy appearance, not smooth.
On his cheek was a triangle, cover-
ing the side of his head, of a lighter
brown, with the base towards the bill
& the apex near the ear. His entire
chest and under-parts were heavily
spotted, but distinctly, with rust-red
splotches, and he had a heart-shaped
patch of the same color in the middle
of his chest, over the wish-bone. All
of the spots were clear cut on his
light feathers. His only note was
a sort of chip. He walked very
alert and sprightly.

← Fox Sparrow - June 13, 1931

Thurs Jan 24, 1929. - Had Eng. Arel exam. this morning & came to Sorton on B.
Drove over to the work-house with Mr. Hammond on the truck, saw Peggy a minute & walked down the hill.
On the last turn above Occquan I was deluged with acorns, by a number of chickadees, titmice, & nut-hatches! Their other friends were around in the other trees, but these were the ones that conspired to drop almost a quart of dried acorns at once. All of them left the tree but one little fellow who loosened an acorn & followed it to the ground, looping under over it several times, then lighting in the road for a second. I just recognized them definitely as old friends, these titmice. Their company & surround-ings brought them back clearly.

Fri. 25-Jan 1929 - Missed Spring mid-year today, temp. 101° & going up.

Sat. 26 - Stayed inside all day.

Sat. 26-Jan. Saw Sikorksky sea-plane or amphibian this morning before noon. It came directly over the house, very low. The boat body was black, and the skeleton framework appeared very funny. The number was C-12085, I think, I had it written down somewhere. At a dist. only the big boat, the 2 small pontoons, & the 2 small engines appeared plainly, the wings double tail, & the supporting framework being almost invisible. It was the same type as the one in which "Gene" Tunney flew from Speculator, over the Hudson to N. Y. City.

Feb. 5, 1929 - Tuesday.

Had Monday 4 off and just got back to school after a 3 day rest. I came home on "31" this evening (4:10), rode as far as Homer's lane with "Buck" Salay in "Babe's" truck. It walked up from there near the lower gravel pit (a short way this side of it). I heard a faint "tzip". I saw a tiny golden-crowned kinglet flying about in the brush, grass, & tiny pines alongside the road. He never got more than 2 ft. above the ground. He let me climb up the bank to get within arms-reach of him, without paying any attention to me. He flew across the road into Selecanan's woods. I followed along the road watching. He then flew up over the high bank into Bubbi's field, stopping by the gravel pit first to let me walk up & get another good look, while he hunted in a little pine about

2 ft. high. On account of my clutter I could not follow him. He seemed to be all alone, altho I heard him chirping among a large group of sparrows in Bubbi's woods, a few yards away. He seemed only slightly longer than the tiny hummingbird, altho Blanchard says 4 to 4.25 in. It was rather cold but he acted happy & contented, also very much unafraid, even friendly.

March 11, 1929 - Saturday

Today was a woodpecker day in the woods! After bringing out the cows I stopped by the gate and watched the birds at work. There were about a dozen pickers, about the same number of yellow-bellied sapsuckers, and about 6 or 8 downy & hairy woodpeckers. One sapsucker went around a young hickory, darting his bill

into each one of the many holes
he had made. It flew when I
reached for my headwater to
stop him from making more
holes.

March 19, Sunday.

One sapsucker was in the
yard today, hammering in the
willow & locust trees.

March 23, Saturday.

This was pinch day. Sparrows
of all sorts, juncos, wild canaries,
and others of the family were in sight
everywhere, and all were singing.

The other birds took a back seat.

In the woods by the pond the black-
birds, jays and flickers made more
noise, being in big flocks, but the sparrows
their relatives were in very bad.

Wed. 27 March - Cant by workhouse
at noon. Saw Pigeon. Saw lots of
crows blackbirds & juncos there.
East. holiday - Sat. today - 11:30 AM.
Friday 29 - March -

Went to Ocasan - saw black
snake by log near the path. My
headwater didn't stop him. He went
into hole. I played ball all
evening. Col. McCullough was down.

Col. Br. Hawk had killed a chicken
this morning as best we could
see coming back. But
I mixed his chicken with the 22.
and he thought it was his.

Saw St. Hawk get another chicken
in Mr. H. L.'s wood, & white
one this time. The other hen was
killed. I got all the eggs yet.

Saw first martin, the first I saw in the
Mon. 1 - April - went to Museum
this morning, there to see

"Broadway Melody" with Lora
 Page 7. I missed at the Club
 went out to E.H. to see the
 play. H. L. C. The one
 was 4 to 1 in favor of H.
 in the fourth round I left.
 May 12 - E.H. 7.

Tues 2 April

Went to the bank
 after the children on my back
 "at" saw a little one in
 the pines. He had a red
 breast and light gold
 on its wings and tail.

The snake was under the
 same big log. Saw 22 built
 finished him. Saw a hawk
 in the pines and watched the
 children & the snake. Then
 I noticed with them a number
 of little yellow-crowned kinglets.
 The first of them I saw
 some Sunday, Feb. 9. And then
 I saw a ruby-crowned kinglet.
 He was a little beauty, too.

and I saw a lot of other things
 been with the yellow-crowned kinglets
 we called them "little ones" and
 there were many of them in the
 woods, and two of what seemed
 to be hermit thrushes. The only
 bird the young was just put.

I heard the one here singing
 happily in the trees. The next I
 noticed several more of his kind
 and when I was to go to the
 bank a stream of blue birds
 was flying over my finger. While
 singing here he was singing so
 merrily that it was almost
 invisible.

Pine
 warbler.

Saw 4 martins over house
 this evening.

Wed. 3 April - Saw "Vince" with
 Connie, Liffie and Victor. Carson.
 Went to the museum, saw
 E.H. fish market. Saw a lot
 in E.H. - saw of E.H.
 Had first whisky in
 town.

Sun. 7 - April

Too hot today to do any outdoor nature work.
Told Carl about the big snake in the pond. He didn't get one until 3:30, a snake about as fast long, and a snake about a foot and a half long. The light of the day, the Carl "snake" snake at the pond.

Tom brought me the framed enlargement of a young frog. The last of the year, had a frog.

Fri. 12 April

Heard the first housewren singing in the woods this morning.

Sat. 13 April

The wren was fighting a bunch of Eng. Sparrows along for his last year's nest box. He didn't forget how

to jump.

A chickadee (I was singing in the top of the willow tree this morning. Being an unusual place for him, I was not certain of its being my old friend. His song & call, sounded like "Cee-phantes". It was repeated at short intervals.

A ruby-crowned kinglet was feeding in the pines by the Oak Tree this morning, and another kinglet was in the pine trees. I couldn't see this one's crown.

Have been killing tent caterpillars all morning. Over the oaks & the cypress!

Sun. 14 April

2 yds snake

Got a water snake at falls, about 2 1/2 ft. long. One bullet thru the very center of his head.

Sat. 20 April

4th snake

Got a 5 ft. black snake on path near pond. One bullet missed him.

and one went thru his mouth
about 2 in. from his head.

Just like brown creeper
W. side of mountain
Nashville
Warbler
4/29/20

Sun. 21 April.

Went out about 12:15 & got
back about 3:30 pm.

The woods were literally
filled with birds & music.
The first thing I saw was a
little bird in the leaves under some
small pines. He had a rufous crown,
olive back, and a dusky yoked,
pale yellow underbody. He was very
small. The description of a Nashville or
Yellow-Rumped Warbler seems to
come nearest to him. Chimney Swift?

Next I saw white-throated &
some white-crowned (D) sparrows,
about several hundred. No one
would be in sight once on the ground,
from a great distance, but when I whistled
their song rose, and soon everyone
was joined in. There is one of the
most beautiful tapping

songs I have ever heard, short,
the "it is". Every bird color on the
white-throat was clearly and brightly defined.

There were perhaps a dozen Chimney Swifts
around me. One was a pale brown
all over, with much rufous on the
sides. He resembled the white-eyed
Chimney Swift (Hawthorne) in the museum.

I saw several black & white
creeping warblers. Every black
stripe was jet black & shining,
and every white one was snow-
white. The contrasting clear-cut
lines make me regard him as
one of the most beautiful birds
I have ever seen. His black legs
& long black bill harmonize with
the rest of his costume. His sweet-
little song is very charming.

Another bird first classified
as a white-throated vireo but later
decided he resembled the description of
the least flycatcher or a Cerulean
flycatcher. He seemed more to be
a warbler, however. The Least

flycatcher in the museum. Looked very much like this bird.

Next I saw what may have been a summer tanager in a pine tree limb. He was, like pink all over his body, with darker red head and tail and brownish wash on the wings. His tail did not seem so long as that of the tanager in the museum, and his bill did not seem as heavy as some of the pink finches. Neither could he have been a crossbill. His rump was dark red like his head.

I considered the purple finch but was not sure of this either. He kept calling, "see-e", "see-e". He looked about the size of a tanager.

I saw a myrtle warbler also, in fact, several of them. He had a golden rump and sides, deep black breast, whitethroat and dark back with lighter lines. Each wing had two distinct white bars.

5th snake

Above the pond I saw a thing, like the olive-backed, but I couldn't tell for sure. I saw a water snake, ^{5th snake} called a log stuck his head up. I put a bullet in his chin & out his back April 27 - Eat. a little one (2 ft) got away.

Saw the first scarlet tanager Thursday 25, in the young apple trees. Also saw the first bee-martin that evening about 6:15. He was in the plum tree, calling to let me know he was back.

I saw the "bee-martin" again today, and also a tanager in the woods.

In the yard there is a beautiful little chubby round bird. His entire body is clear bright gold, the wings a little darker, and a number of short stripes down the upper breast. His song is "witch, witch, witch, witch" in short tones, at very frequent intervals. I think he is the "Yellow Warbler", the "Summer Yellowbird".

I saw a myrtle warbler (or several rather, again). I identified

Yellow Warbler 4/20/70

him today.

Another little bird sang "cheer, cheer, cheer", or "vee-ee-ee". We used to interpret his song, "May, Delia, come here". He was gold, somewhat dark, with dark tail and white underbody. The head, back(?) & breast were gold. yellow-throated vireo? O.K. - 7/29/50

In the oak tree I saw a warbler with olive back, gold rump, & tiny gold spot in the center of crown. I couldn't see his body very well, but it seemed whitish-yellow or gray with faint streaks. However he may have been a myrtle warbler. - 7/29/50

On the way to Ocean Grove about 11:45 A.M. I heard a pretty song and looked into the pines by Morgan's gate. There was a pair of Redstarts, whom I became acquainted with last year in my front yard. These are the first of the year.

A little farther a bee-eater was sitting on the electric light wires over the road. Still farther, near Smoot's new house, I saw a Maryland yellowthroat, the first of the year.

A few months ago I found the beautifully built grey nest of the oriole, in the oak tree at Mc Mahon's fence, where the oriole used to be.

Saw 3 hawks today, but no snakes.

A woodchuck was eating on the ground near the pond. He flew from me as I approached, finally disappearing.

7/29

1 warbler. Back - olive green, upper breast & sides heavily streaked with black. Sang loudly & continually & walked along the limb freely. Another answered him from a nearby limb. King + Sanderling (5/1/51) or Blackpoll -

1 warbler - olive green back, wings & tail. Bright olive gold under parts - sides

of breast heavily streaked with black or red-brown. Sang constantly - "Zhe-zhe, zhe-zhe-zhe". Had bright brown red line thru eye & curved brown red line under eye like inverted sickle. Long & slim, standing erect. Was near ground & in trees. Prairie Warbler (5/8/29)

1 pr. Maryland Yellowthroats in bushy oak stream behind hill by the house.

6 or 8 Catbirds in swamp near road. (In field.)

1 warbler near yellowthroats.

7 Worm-eating warbler? olive-green back, gray underneath, faint yellow wash on breast-plumage. Kept near ground, in small bushes. (or ♀ Maryland? 3/31/29)

Several Chewinks - same place.

One warbler on Sycamore - thin wing, tall, slow. Eating a caterpillar on a limb.

7 Olive-green back, slate crown, slightly heavy bill (i.e., didn't taper out sharply). Seemed to be hunting for food on hill. Also seemed to have bristles at base of bill.

Wilson's or Black-throated Warbler (1/2 brother)

Tennessee Warbler (?) 2/29/30

Saw hundreds more blue jays going north in one flock, some light scattered. About 50 in one compact group. They lit in the woods by the house. Adogen or so stay here always.

May 4, Sat.

Heard a yellow-billed cuckoo this A. about 7:00. Will be welcome.

The tent caterpillars are on everything.

Killed a water-snake at pond, 6th snake. about 2:15 or 2:30. The shot almost scared two muskrats to death. They dived into their underwater beds like skates, going under the bank.

Another water snake got away. All the song sparrows, and the swifts also, are here now.

A bluebird has a nest in Mrs. Metzger's Starjones box.

A Catbird has a nest in a pine about 4 ft. from the ground, on the path to the pond. There were 3 eggs, white,

heavily spotted with chocolate.

Jan May 5.

Saw another pair of beautiful birds at the pond, in the bushes. These warblers had Gold bodies, necks and backs, lower back olive green and black. Upper back with white bars. Shiny black throat & breast, also had white shoulders & underparts. Black-throated green warblers.

Saw dozens of Myrtle Warblers. Flycatcher - size of robin - yellow underparts - olive green back - call "quit-quit" - very loud. Was first to wild cherry tree & later near pond. There seemed him. Great Crested Flycatcher. Forget to mention Crest.

7. Warbler - olive green back, orange yellow throat & upper breast - black line around throat - dark head - white underparts - Kentucky(?) or Canadian(?) Warbler.
4/20/30

One warbler like the myrtle, but:

Had black stripes instead of solid black breast & sides. Yellow spots on sides, crown & nape, white throat, clearly defined by black stripe at bottom. Slim. The stripes puzzle me. Must be Myrtle.
4/20/30.

Perhaps Hummer - 7/29/30

One water bird at pond. Sandy pepper & salt, black back & breast. White underbody. Long bill. Pink or black legs. "Dee dee dee" when disturbed. Lesser Scaup - 5/9/30

The bird I before called a Louisiana water thrush was in bush in marsh, singing sweetly.

Several pairs of Maryland yellowthroats were in marsh at pond.

One or two male scarlet tanagers at pond.
Many wood thrushes. One of

Chen fussed with me a long time.
"Pit, pit, pit!"

7th. I killed my 7th. water snake
in the pond. Saw his body in weeds,
by using binoculars. Finally saw $\frac{1}{2}$ in
or so of nose showing from behind
blade of water grass. The bullet went
in back of his eye, killing like a
knife.

Watched a muskrat carry
the grass roots to his home under
the bank. Another came in without
a load. They went in & out, &
finally one came out & swam
all over the pond, under water.
After two or three minutes he came
back with a big surfish, I think.
I stood over the head about 10 ft. from
them. When they swam on top big drops
of water hid on the fur.

May 7 - Tuesday.
Heard oriole for first time,
this A.M. about 6:00.

Found yellow-billed cuckoo
dead in garden by stab killed A.M.
Feathers in front of chicken house
showed that something probably
caught him in the plum tree there.
We needed him badly too, as
the caterpillars are on everything.

Wednesday, May 8, 1929.

Saw oriole this evening on
the clothes line (5:00 P.M.) He
pulled a shoulder strap of some
dress or something. He was a she,
however. I hung up 5 pieces of
string to help with his nest.
The pair was in the cherry tree
over the chicken house. Also
a male oriole. The
female flew before I could
look at her. He was black
above & on wings & head, dark

red rust-brown below. He was singing in the cherry tree & walnut tree.

The summer tanager was singing in the big wild cherry tree this evening. He was pinkish-red all over, with darker red head & rump. He is the same bird I saw in the pines April 21. I also saw what seemed to be a swift warbler in the garden, running on the ground & then in the locust tree. He looked the same as the bird that puzzled me, June, May 5.

A yellow-bellied cuckoo was eating caterpillars in the locust tree. The orioles were busy at the tree.

I feel better on being the friends.

A flock of myrtle warblers was on the lot.

May 9, Thursday.

About 2 dozen ^{Warblers} in procession way to road. They were a little larger than Eng. sparrows, but rather plump.

[Veeries ^{July 12, 1903} ↓]

They were red brown on the back, buffy-gray underneath. Rather buff wash on throat. Eyes big and dark.

Pair of little warblers at Snyder's. They flashed into the pines & I couldn't get a look at them, but they seemed Maryland yellow-throats.

Pair of yellow Warblers at Flieger's.

Many black warblers were in the trees around the pond. The head, back, chin, throat & upper breast were jet, shiny black. In some lights the head & upper back appeared very deep, dark blue. A conspicuous, somewhat egg-shaped white spot was on the wing. The under parts, below the black belt, were snow white. "Gee-gee-gee-wee, wee, weet," a sweet song, was constantly repeated by many little throats. They hunted diligently thru the sedge more & sedge trees in the marsh. The description of the

Back seemed darker - like
Carolina warbler - 7/29/30 - This year back
looked lighter than last - better vision in and probably.

Black-throated Blue Warbler
fits him imperfectly.

There were many Black-
throated green Warblers at the pond
also. They are beautiful.

There was another little
warbler with olive-green back,
slaty head - gray-white underbody
white. White spot on lower back.

Vireo?

4/20/30

Tennessee Warbler - 7/29/30

There was another warbler in
the tall bushes - orange-yellow
head & neck, olive-green wings -
yellow back & stomach.

Prothonotary Warbler?
4/20/30 - 7/29/30

Several warblers - olive-green back,
yellow underparts. Black hood over head
& neck & upper bill & on the chin. Enlarged
bright yellow circle on cheek about eye.
Hooded Warbler.

Some tiny warblers - olive-green
or dusky wings & back. Orange-yellow
on rest back, between wings. Dark

head, yellow wash on upper part.
Parula warbler?

4/20/30

Several redstarts at pond.

Several pairs of warblers -
black & white striped on top &
checkers. Broad black line over
eyes & white line under eyes. White
underbody - black & white striped
between legs & back of legs.
Black legs & feet. Black-jacket W.

9/20/30

May 11, Saturday.

Killed spotted-head moccasin
8th. about 1 ft. long on road back of
New land. Stopped about 3 ft. from
me & spread his neck about 1 in. wide
and about two inches in length. Hog-Nose snake

9th.
4/10/30
Snake

Killed two six-foot black snakes
with white stripes, under bush
in Bubba's field. One had the
skin off its back in several
(5 or 6) places, as though it had

been buried. {These snakes look exactly like the ones of "Chas. snakes" in the museum, & were lying just like them - also, resembled red snakes.

Saw what was a female Blackburnian Warbler, more likely Redstart.

Saw also several male Redstarts.

Walked up to within 3 ft. of brown thrasher's nest in a bush, before I saw her. She didn't move as I turned away.

Saw one male & two female Cowbirds walking & pecking around nest & feet of cow & horse in our field.

May 12, Saturday. Sunday.

Several warblers - Slate-blue head & back. Red-yellow shoulders (between wings). Yellow rectangle on throat, bordered on all sides by slate. Narrow slate line below yellow throat then yellow breast, with red-brown center. Underneath white.

Parula Warbler.

Saw a number of Redstarts.

Quite a few of what seemed to be Blackpoll warblers.

Black crown & sides of head to bottom of eyes. Broad white line under eyes. Black stripe from bill down neck on each side. White center of breast & under body. Black rusty back & white stripes. Twittled as walked along limb.

In the marsh I saw a number of little warblers looking like cowbirds, except for long, slender bill. Two white outer tail feathers conspicuous in flight - white lower stomach. Tail constantly snapping & used for balancing when alighting quickly on limb, or reach out for worm & insects. They were usually above stream into pond, by wig hills. Seemed rather tame. Blue-gray Gnatcatcher.

Beside the road to "Ed Williams" place I glimpsed a pheasant which had

been scratching on sunny hillside.

In reading over the descriptions of various warblers, I recognize the "Blue-winged", "Chestnut-sided", "Magnolia", & ⁽⁶⁻¹⁰⁾ ~~Ruby~~ warblers as among those I have seen this spring.

O.K. Have also seen Wilson's Thrush, or Wren, and the Hermit Thrush. Among the other small thrushes I have seen have probably been the Alice's, Olive-backed, & the Water thrush, but I haven't been able to identify them definitely.

The tulip trees are blooming now, & in them I saw a large flock of Cherry birds. They are in the mulberry trees now (6:15 PM) eating them before they get red.

May 25, 1929 Sat.

Ruby-throated humming birds have been here about 3 wks.

The fireflies arrived about 2 wks.

May 26, 1929
Sun.
11th day
4th week
of season

Killed 2 snakes today. One water snake about 2½ ft. long at pond, the one that got away from "before", and a water snake about 6 ft. long on Bubbe's branch.

Dozens of Goldfinches in marsh today. They were all singing at one time, sub several redstarts, and several blackpoll warblers.

Mon, May 28, 1929

Saw dozens of little warblers or flycatchers this evening. They were all over Bubbe's field & in the pines. They were dusky olive-gr. or yellow on the back, & lighter grayish yellow on their underparts. Several white outer tail feathers showed in flight. They flew along darting in every

direction, snapping their bills repeatedly as they snapped up insects. In the trees they picked at insects like warblers & darted after bugs. Female Prairie Warblers? - 5/9/30.

Out in the field were many warblers, bright yellow underneath, heavily streaked on the sides & neck with bright black, with a black spot back of & below the eye. They sang constantly "wilt wilt wilt, wee wee wee" - Prairie Warblers - 5/9/30

Tues. June 4, 1929.

Holiday today. School closes tomorrow. Killed 2 snakes. One 3 ft.

13th. water snake in marsh above pond,
4/4th. and a black snake over 6 ft. long on
snakes. the branch running from the "Castle Woods" thru Bulb woods.

Have seen many blackpoll warblers around the pond. Seems as tho they intend to stay all summer. I see pairs of Maryland Yellow-

throats every where I go. They are rather tame.

June 15, Sat. 7. I saw two of our gayest & sweetest cheerful citizens shamelessly making love today at the pond.

Mr. Chick A. Dec was dancing around Mrs. "Chick", fluttering his wings so rapidly they could scarcely be seen. He was whistling rapidly "dee dee dee dee".

I saw three plump youngsters of theirs in a pine at the pond, some weeks ago. There may have been more than three but that was all I could see in the thick pine. That is, all I could see at one time.

June 22, 1929 - Sunday.

The second brood of young wrens is about to leave the nest in the pear tree. This half of gallon oil can has to its credit 2 or 3 broods last year and two so far this year. The first or second brood is ready to leave the tomato

can hanging from a low limb
in the small plum tree by the
back porch.

The second brood of young
robins has left the nest in the
top of the locust tree.

A sparrow nest in the top
of the pear tree by Peggy's flower
garden.

I located another robin's
nest in a small cedar tree on
the lot today, using the binoculars.

I found a catbird's nest in
a little dogwood tree on the
banks of the Crab-pond, the other
evening, & at the same time
located the summer tanager's
nest in a little cedar, about
8 ft. from the ground. The tree
is on the bank on this side, next to
Carl's house, opposite the catbird.

A wood thrush had a nest
in a little oak over the path to
Ed Williams. It has been vacant for
some weeks, & now it's gone.

The wind blew it away, perhaps.
There is another nest somewhere
near that one, as I see the wood
thrush flying back and forth
there with food. There are perhaps
six or eight young thrushes flying
around in a bunch. Two broods
joined I guess.

The Baltimore Orioles have
only showed up once or twice
on rainy days in The Orchard.
Oriole is seldom out of sight
for more than a few minutes
at a time. He is singing constantly
in the top of some of the trees
around the house. His favorite
tree is the apple tree in front
of the chicken house, with the
cherry tree, wild cherry trees &
walnut tree, ranking about equal
next to that.

I have not been able to find
either of the orioles' nests.

I had lots of fun last week in
Alexandria, watching the scowmen

of the Eagle patrol playing with
their 30 live snakes. They had
one mountain rattlesnake and one
mounted copperhead, but no other (?)
poisonous snakes. They also had
a horned toad, a pair of fence
lizards, 3 Japanese rats, etc. The
pilot, black snake struck the
scent master five times while he
was tracing it. There were five little
drops of blood showing around on
his hand. Sort of "X" marks the spot
affair. The S.M. is connected with
the Wash. zoo or museum, I don't
remember which.

The nests I named above are
only a few of those I have found
this year, and only a very few of
those present on our place.

Speaking of sardines, I saw
five young Whitebills raised in a
shallow Woodpecker hole in large old
pine stump, serving as a fence post
in the fence below the oak tree.

When I first saw them they

had only a few pinfeathers, &
things were not so bad. Later
they were fully clothed and
ready to leave the nest, and
conditions were crowded. I
stroked their heads and they
huddled down as low as possible.
Two days later mamma &
I looked for them, but they were
gone. While I was getting
them that day the parents
sat nearby but didn't seem to
mind me.

June 26, Thursday.

Last Sunday evening I went down on the
lot & found 5 empty chip-sparrow nests
from this spring, and another one with
2 young Chippies. There were 3 young
robins in the nest in the cedar.

There is a nest of bee-martins
in the top of the apple tree in front
of Carl's garden. They are about ready
to leave. It is almost invisible, being
hidden in a thick leaf-clump, & a hole

with about 15 apples hangs right down over the nest.

There is another wren nest in the tomato can on the corner fence part of the garden.

I saw one little mockingbird the other day in the yard. He had just left the nest, in the second cedar from the black cherry tree.

The corner oak, over the old cellar has a robin(?) nest in almost exactly the same spot as the oriole nest was last year. A little ways down in the woods is a robin or wood thrush nest high up in a fork against the side of a black oak. I found these when the robins, catbirds, & wood thrushes were fussing about something back of the chicken house, & so there were no birds on the nests to identify them.

I killed two young rats & 3 mice with 22 shot shells this morning there was at least a dozen of them in one nest under the floor back of

the tool house.

I just remembered that on June 15, when I saw the loving chickadees, I also saw several Hooded warblers, either immature or females, as they had only small heads. They sang gaily & constantly. I also saw a number of blackpolls and some Maryland yellowthroats. One of these, a beautifully colored male, sat on a post in the garden yesterday & sang for a few minutes.

The young summer tanager has left his nest in the cedar. The Baltimore Orioles have been here for several days, eating the plums on the trees.

The Orchard Oriole has not been seen for a few days.

15th.
snake.

I killed a ribbon-snake or water snake about 2 ft. long on a tree limb about over the 3rd. Culvert from Horns Baber's place.

July 2. Tuesday - Went down to

road with Anita today. Killed 2 ft.
water snake at culvert at bottom
of Hornbaker's hill.
Killed 5 or 6 ft. black snake inside
Bubbe's place by bars.

July 3rd 4th.

Put big Diamond-back terrapin
in pond. Carl caught him Sunday
in stream below wetlands on
old road. We were coming back
from Peabody-Dumfries ball
game at Rott's store. "Dip" was
about 15 in. long & about 10 wide.

18th
snake
X

Forgot to mention this snake
in proper place. Should have been
16th. I was going to Woodbridge
at 3 o'clock when I heard the
birds fussing in Bubbe's woods
back of the culvert. There were
about 2 dozen robins, six or eight
catbirds, about 4 cardinals, some
wrens, & the pair of Indigo Buntings
the first time I have seen them
this year. One pair of robins

especially, would light on
a little open clump of briars,
and leap in & back out quickly.
I went thru the fence & briars
saw a big black snake, fully
6 ft. long. He still had a bolt
of his tail hung over a limb
2 or 3 ft. from the ground.
The lower part of his body was
coiled up tightly, and he had his
head buried and the wing of a
baby robin he had just gotten
out of the bush. I could find
only a stick about 3 ft. long
& 2 in. thick, very heavy. I
jabbed in thru the bushes,
striking his head several times.
He thrashed about for a time,
& suddenly darted out for the
thick bushes. I drove his head
about 3 in. in the mud & took
the young robin from under the
bush, laying him on a limb. The
parents searched on the ground for
him, fussed around the snake,

undecided whether he was dead or not, & were still busy when I left, 15 min. later. I felt so sorry for them, calling & screaming constantly.

I have since seen the Indigo Buntings near the house. They appeared ready to build in a pine, some days ago, on the path near where they nested last year.

Last week I saw several pairs of redstarts, in the pines at Dago hill, fussing about something. A bunch of weeds & catbirds were with them.

Haven't seen or heard anything of the Orchard Oriole for a week or more now. Blanchard says his song ends early in July.

The female Baltimore Oriole has been here at all times of the day, lately, eating the plums.

I think a Scarlet Tanager has his nest in the big willow oak at the bottom of the hill.

19th. snake

July 8, 1929 Monday.

Killed 3 ft. Watersnake at falls today. He had many small rings around his body, resembling a Cornsnake. He swam weakly down stream with part of his "insides" out. I wanted to kill him outright but he disappeared a few yards from where I shot him.

Saw a black & white creeper on a tree in McManis woods, back of the old cellar this evening. I was going to Wood Budget & hadn't time to watch him. He seemed to be alone, but happy. I followed him around a black oak, whence he flew to a white oak, & then flew up among the limbs where I couldn't see him.

Found dead muskrat at pond today. "Sliders" / "snappers" were trying to eat him. Just his nose was in the water. Saw a live muskrat swimming home. Saw 3 new squirrel nests.

Watched beautiful mathon
screep at about 9:15 AM.
caught him & kept him
for a while, then turned
him loose. (Or her more
likely).

Thursday, July 11, 1929

Mama went to Wash. This
morning. Aunt went to Ocoguan
& asked me to meet her at the road
at 2 o'clock. While waiting there I killed
^{20th & 21st snakes} a ribbon snake about 1½ ft. long,
in stream, and a young copperhead
in the stream a little farther up. A
large water snake got back under the
little falls. I missed his head later
when he poked it out. I tore the place
up but ~~have~~ couldn't find him. Have
seen him several times since.

Saturday, July 13, 1929.

^{22nd.} Killed 3 ft. Copperhead on
pile of brush over stream in Castle
snake. Wabbs. One bullet thru head,
just inside right eye.

Saw prairie warbler on path
just over hill this evening. It
let me get within a few feet
of him several times & I got a good
look at him. His head, neck,
throat, & stomach were clear
yellow, the throat & stomach
heavily streaked with black.
I got a good look at the chestnut
spots between his shoulders.
His wings, back, & tail were olive
green. He sang as he hunted.

Sunday, July 14, 1929

Went after snake at road about
11:30 A.M. Saw Great Crested
Flycatcher on dead tree behind
old cellar, yelping to his mate
who was there also. Saw some
Blue-Gray Gnatcatchers high
up in pines by stream near road.
Went over to marsh in middle
of Subb's field. Saw what
must have been a yellow-
breasted Chat there. I heard

him fussing and squeaked up
to within 5 ft of him, he sat
there in a magnolia tree, watching
me, and fussing. His head,
neck, back, wings, and tail were
brownish or dark olive green. His
throat and breast down to his
legs were bright clear yellow,
darkest on the throat. From his
legs back his body was white.
His bill was black and some-
what heavy, and seemed to
resemble a shriek very
much, even to the hook. His
legs were dark gray.

Heavy
white
bill
dark
eyes
white, dark
ring around
eye.

His body didn't move the
whole time, except his head and
throat as he tilted them somewhat
to scold. His throat would swell
and the harsh "chirp, chirp," at
intervals, had a twang as though
coming from a stringed instru-
ment, a banjo. Once he sang
a pretty little song. I watched
him a long time, noting

around into the bushes in
back of him, while he sat there
fussing. A little Maryland
Yellowthroat (female) hopped
around in the bushes below him.
Later he was flying along in the
bushes near me and scolding,
and his wings & tail (which was
pumped up & down as he flew)
made a loud, heavy, slapping
sound. This may have been
another bird instead of the
same one, the mate possibly.
I forgot to mention a broad
white line over his eye from
bill to throat, & a tiny white eye-
ring.

While following a narrow
path through high dense walls of
brars, alders, magnolias,
sassafras & willows, a little
bird fluttered in bushes about
2 ft. from my head. It looked
like a baby black & white,
creeping warbler, but it

hunted in the bushes a few feet from me, like an old bird, hanging upside down, flitting, moving along limbs, etc.

His feathers were ragged and pale like a young bird not yet fully clothed only the outer tail feathers were present. After awhile he passed out of sight in the dense briars a few feet away.

I climbed the huge maple tree and stayed a long time. A mourning dove lit about 10 ft. away in the other part of this double tree, and after awhile cooed a bit, her voice sounding as low as it would sound at a great distance. After about 10 min. she flew.

I saw a number of Carolina wrens in the marsh here, as on the path to the road. They just appeared in the last week. They are here every year in these two places,

as well as at the pond.

There is a big hollow back of the hill behind our house. Thru this hollow a stream runs and down thru Bubbs place, to marsh I was in this morning. On the stream I saw a bird which must have been a female chowink, but didn't exactly resemble any I ever saw. The bird was scratching like a chowink, in the leaves back in a dark nook under briars & bushes. Its back was brown with a reddish-chestnut wash on back of the head & neck. There were a number of white streaks running lengthwise of the wings, and white outer tail feathers, making the birds lower back seem streaked with white.

A little farther up, nearer the house I saw a little Maryland yellow throat singing. They have

speckled
breast
buff
grey

nest near here I think, where
the road cuts thru the hollow.

* The bird that seemed a
Chewink had its breast liberally
speckled with light grayish-brown
streaks, like the upper parts of
exclamation points. They ran
straight up & down. The breast
was pale grayish-buff.

Wed. July 24, 1929

Played ball Monday for the
first time in 6 or 7 weeks (since
June 14). Played Tuesday. Wed. we
went over to Ponick's run with
Oscar, having gravel to the school
ground for J.P. Davis. Got back 4:30.

23rd. Bubby and I went out on bridge
with beamshooters. Saw a foot
water snake at foot of the first
waterfall ^{that} ~~that~~ ⁱⁿ the water on this side.
after a few shots he slid under
a log. Then a foot long snake
swam out. We shot at him

for 5 min. I came within
6 in. of him once, & Bubby
came within about 3 in. of him.
He was straight under us and the
shooting was done in a very
cramped fashion. Finally I got
in a little better position, and
the ~~second~~ first rock whacked
him on the head. He turned
over on his back, and laid
motionless for a while, finally
floating out with the tide, stone
dead. Saw a dozen large "sliders".

Thurs. July 26, 1929.

Played ball today. Leo Macmahon
& Oscar were there, also Bob Macallan.
Dumfries wrote that they couldn't
play Monday Sat., but would
Monday.

Bubby & I went out on bridge
saw one large & one small snake.
we nicked both several times.

Saw an Indigo bunting (male)
singing on the spire by the bridge
Wednesday & today.

Babbs started tracking today.

Sunday, July 29, 1929.

^(Killed at Heron)
Saw white crane at pond.

He certainly was beautiful.

24th Killed black snake on
snake stream from Castle woods.

He was velvety black, about
5 ft. long. Shot & saw 2,
but the one that went under
the bank may have slid up
to the top, under the bushes,
where I killed it.

Tuesday, July 30, 1929

Went down the stream back
of Mr. Alling's paint shop, with

25th "Bobby". Saw dozens of birds
of all kinds along the shore.

snake. On the way back I killed
a 2½ ft. water snake in a
pool back of the work shop.

This was a green looking
snake, having light rings
around its body, not like

an ordinary water snake.

Went to Woodbridge this morning
to get egg crate. Pitched horseshoes,
Harry Sundette and I, "Bobby" & "Shorty"
& Harold pitching by himself. Harry
& I won 3 out of 5 games.

"Bob" & "Dutch" McMahon
came down. "Bob" MacCallum,
"Billy" Sanford and I, stood
"Bobby"; Harold Sanford, and
George Mac Mahan. Clyde
Beard played first base
for both sides. "Bobby",
"Billy" & I won, 4 to 2.

George broke "Bobby's" intent
idly off on an inside ball pitched.
I hit one over the woodshed
& so did George.

Mary starts her vacation
this evening.

August 23, 1929; ~~Thursday~~ ^{Friday}.

Lazy lately; haven't been
keeping my traps. A female
Orchard Quail has been

taking the last of the red
grapes from the cedar trees
to now from the vines outside
the window. I got within 3 ft.
of her this eve. I haven't
seen the male since late
in July, when I saw one on
the Wood ~~B~~ ridge school
ground, & before down at
Kate Chamberlaid's, this side of
Wittner's. I wonder where
he is, and the children, if any.

The female Balt. Oriole
appeared some time ago
during a rain, as last year,
but later she has been around
a lot, in the middle of this long
dry spell, which started
early in ~~Aug~~ July, broken
only twice by a little rain.
No male or children here
either, as yet.

Have seen the flocks
of woods "white wings" many
times lately; the downy wood-

peckers, nutcrackers, chick-
adees, black & white creepers,
vireos, etc. I have not yet
sighted a brown creeper among
them, but they are very
inconspicuous anyway, & I
haven't watched closely.

On way home from
Wood Bridge this eve (about 5:35 or 5:40)
I saw about a dozen little
pine warblers. They were
smoky, dusky ^(of gr.) yellow on the
back, and lighter underneath. The
wings & tail were d. green, with
the white outer tail feathers
very conspicuous, especially
when flying from limb to limb
or darting after insects, like
flycatchers, when the tail was
spread. They were in the large
pines & small shrubs along the
path near the big willow oak,
on the way to the road.

I saw a large ~~downy~~ hairy
woodpecker in the dead

tree in Selkman's woods, near
the road into the woods.

I saw another hairy in
a dead tree in Mac Mahan's
back of the house. Both
of these were seen in early
August.

Special Note: —


During the summer
2 or 3 yrs. ago, Peggy
& I were going to Occequan.
We went thru Mac Mahan's.
In the middle of the road between
the small pines, just after
we came out of the pines
near Evelyn's we found
a large squirrel (grey) dead.
Its jaws were firmly
clamped over the neck,
several inches back of the
head, of a large black snake.
The snake was about
5 ft. long. The grey squirrel
was somewhat swollen.

Seems as tho' the grey squirrel
killed the snake by crushing
its back-bone but got its medicine
in the meantime. The squirrel's
legs were spread as tho' he'd
been trying to get a purchase on
the ground to hold the snake.

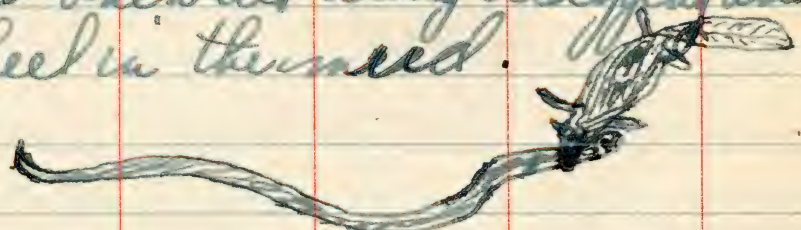
We went back in the P.M. to
get a picture, but both were
gone.

On the way back from
Occequan we got a ride, &
came in Bubb's road. As
we walked along I noticed
a series of loops scratched
in the sand, resembling those
done by an airplane, using smoke-
writing. I looked back & there
was a poor tortoise with a
ball of the red clay, like snow
on a horse's hoof, stuck to
his under shell, so large that
he could only reach the ground
with the two feet of one side,
at one time! The lump was

getting danger all the time,
as he dug along the level
stretch of red clay beside the
road. In one place he
had spun, like a top, gone
on, and when we reached him,
was spinning again. I knocked
the ball off, scraped his
plate clean, & set him off
in the grass.

The circles were almost perfectly
round. 

The ground was ~~was~~ dug up as
the one went along dragging a
heel in the mud.



Head Washington win their
third straight game from "Bucky"
Harris' Detroit Tigers, today,
Myles Thomas & Fred Mackery
beating them 9 to 6. Wash.
made 4 triples, Hayes,

Judge, West, & Rice. 1 double
play. On a hot line drive to
Sam Rice in Rt. field, Johnson
(Roy) was caught at the plate by
a wonderful peg.

E. C. Braxton won the first 61,
Goslin & Hayes getting homers.
Had "Sam" Jones, recovering
from a long series of illnesses,
beat Detroit in the second
game, 1-0, three double
plays killing off Detroit
rallies. A hit & run with
Myer on first, and Cronin
at bat, scored Myer on a
long slide. Wash. is in
sixth place now, but only
1 game back of Detroit,

& the last game of this series
tomorrow. "Bubly" has
won 15¢ from Maiguette
so far, she having bet him
5¢ on "Bucky" in each game.

Killed 1 squirrel the week
Mary was home. One bullet

from the 22 at 30 yds. did it. It went thru his head between the ears as he lay on a limb which slanted downwards towards the tree.

(August 27)

August 22, 23, or 24 (?) (there, 7 in, or 10 in)

Purple Martins must be preparing to go south. Saw a flock of about 30 or 40 flying back & forth over Thomson's house barn, & martin box. They were in a compact group and not after insects. Blanchard says early September. I don't believe I've heard or seen those of Carl's flock for a few days.

Aug 27. Tues.

Wash. lost their last game to Dehon.

(Sunday)

8-7 in 11 innings. Two errors by "Buddy" Myer let in two runs & paved the way for more. Thus Marguerite's favorite "Nat" saved her one more.

Kadley, Brantley, & Marberry pitched for Wash. Marberry lost.

Aug. 27- The female orchard oriole is outside the window now, after grapes. I'm afraid they're all gone.

Darn it! I'm all joggled. I wasn't sure whether this was a female scarlet tanager or orchard oriole. I haven't seen a tanager female closely for a long time, & I never have gotten a good look at a female orch. oriole, knowing it to be such. I don't think this is an orch. oriole, but Blanchard says an oriole has a black throat. This one hasn't, but resembles closely the female orchard oriole painted in R.B. Hargrett's book of Bird Paintings. This bird says: "Chirp!", "Chirp!" constantly. She was up in the walnut tree by the chicken house today, (just now), going over every limb-tip carefully, chirping all the while.

Sun.⁽¹²⁾, Aug. 25⁽¹²⁾, 1929.

Went down in Mc Mahan's woods this A. M. after hawk.

26th. Killed 1 little spread-head moccasin snake. (hog-nosed snake) about 8 in. long, with a stick.

Went across new land with my gun to look thru our woods for squirrels. On fence line of new land, I killed 27th. 6 ft. black snake. Blew her head off.

Sun. Sept. 1, 1929.

Came down lane today with gun, walking close to fence, looking for toads to rescue out of foot holes. Almost stepped on large copper head. Her head & tail were in a hole under a big 6 ft. stump serving as a fence post. I shot her once or twice with the beanshooter to break her back, & pulled her out. She faced around

& stuck out her tongue. I killed her with the beanshooter & poked in the hole under the stump with a 2 ft. stick. Out of this mole-burrow in ~~under~~ the loose ground slid the snake. I knew he couldn't get away so I shot him a few times with the beanshooter. His back was hurt, but he whirled around & slid back into a mole hole. I dug up all the ground around the stump with the little stick, & then called David to get Papa to bring the pick. Dad came instead & brot his automatic & rifle, neither of which I needed. I went for his mattock & showed him where to dig. He cut part way thru the snake, pulled him out, & shot him with the rifle. However I could have killed him with my beanshooter or gun, so he's mine.

Mon., Sept. 2, 1929.

went out early this AM. Got one squirrel. met Johnny hunting. He had one, also.

Shot two hawks, twice each. the first one, in the woods, at about 15 & 40 yds. or less, & the second, a large mass. hawk, in the open field, at about 20 & 35 yds.

Didn't get either one, altho all four shots were perfect hits, & both hawks were hard hit. These Rem. Nitro Clubs looked old when I got them. They haven't much killing power. The 1st. hawk sailed back into the woods, real low, & the 2nd. dropped in Bubbs' corn, I think.

Tues., Sept. 3, 1929.

Saw many little woods birds near the old gun tree this AM. Saw one bird which, from the bottom, looked like a female scarlet

blotched young male Tanager 7/29/29

tanagers. Her head seemed very plump, tho, & from the middle of her stomach, down between her legs, & on back ran what resembled a half-inch wide streak of blood. It was some sort of red marking.

Saw also what appeared to be weevils in the trees, quite a number of them.

In a hickory I saw a small thrush, a very little (if any), larger than an Engl. sparrow. His upper breast was thickly spotted with small round dots (like B. B's.) He was very tame, & flew about picking insects, also sitting still for short spaces of time, looking about. Over bird (?) 7/29/29

Monday, Sept. 9, 1929

30th. Killed one king-snake in back yard today. I didn't want him to go in on the porch. I shot him thru the body as he

Sept. 12, 1929. went under the steps. Papa tried to pull him out & he pulled in two.

The dogs were playing with me outside just now (about 8 o'clock). We wouldn't let them come in the gate, and a few minutes later I heard a shot down at Bub's barn. I went out & in haste, but the puppy didn't show up. I'm afraid he got his. I suppose Bub was mad over paying the surgeon's bill.

Fri. Sept. 13, 1929

Puppy was here this morning. I didn't expect to see him again.

Went hunting in Bub's woods, this A.M. Met 3 flocks of tree-surgeons. At the pond I saw 1 hairy woodpecker, 1 black & white-creeping warbler,

1. Russell - Common ground warbler - (Sagehen)
2. White-throated sparrow
3. White-throated sparrow
4. White-throated sparrow
5. White-throated sparrow
6. White-throated sparrow
7. White-throated sparrow
8. White-throated sparrow
9. White-throated sparrow
10. White-throated sparrow

Maryland Yellowthroat.

Thurs. Sept.
12, 1929.

went under the steps. Papa
tried to pull him out & he pulled
in two.

The dogs were playing with
me outside great house (about
8 o'clock). We wouldn't let them
come in the gate, and a
few minutes later I heard
a shot down at Bub's barn.
I went out & in haste, but
the puppy didn't show up.
I'm afraid he got hit.
I guess Bub was mad
over losing the puppy.
They.

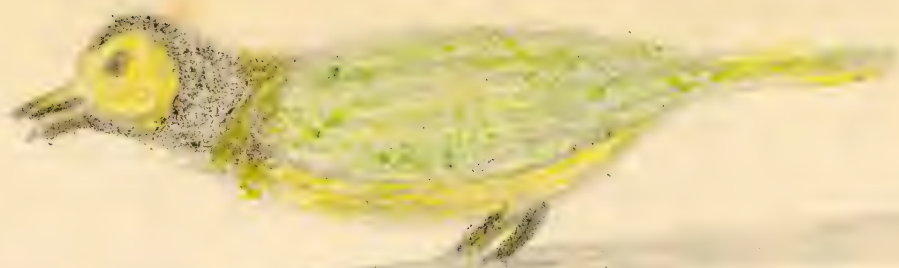
Fri. Sept. 13, 1929

Puppy was here this morning.
I didn't expect to see him
again.

Went hunting in Bub's woods
this A.M. Met 3 flocks of
tree-surgons. At the pond I
saw 1 hairy woodpecker,
1 black & white-creeper warbler,

2 redstarts (The first
I've seen in some time),
many pine warblers,
several downy woodpeckers,
and many nuthatches,
chickadees, & titmice, all
of which I couldn't see, because
of the poor light. Up in top
of the Big oak in which many
of them were working, were
two birds, resembling shrikes
from below, & of almost the
same color. They darted back
& forth as tho after prey on
other flying insects. Because
of the dull, gray, cloudy sky
the birds were hard to identify.
I named the redstarts first by
their spread tail & wings before
I saw their colors. "Hairy"
certainly can drum. This
flock must have numbered
several dozen birds.

Saw a young, or female,
Maryland Yellowthroat.



$$\begin{array}{r} 10.320 \\ 10.320 \\ 10.321 \\ \hline 30.981 \\ \hline 10.320 \end{array}$$

$$\begin{array}{r} 10.120 \\ 10.119 \\ 10.120 \\ \hline 30.3590 \\ \hline 10.1196 \end{array}$$

$$\begin{array}{r} 11.030 \\ 10.320 \end{array}$$

$$\begin{array}{r} 1052 \\ 11 \\ \hline 52 \\ 52 \\ \hline 2652 \\ 26510 \end{array}$$

$$\begin{array}{r} 10.320 \\ 10.250 \\ 10.180 \\ 10.1196 \\ 10.050 \\ \hline 50.9196 \\ \hline 10.1839 \end{array}$$

$$\begin{array}{r} 11.030 \\ 10.120 \\ \hline 1.910 \end{array}$$

$$\begin{array}{r} 11.0300 \\ 10.1839 \\ \hline 1.9461 \end{array}$$

$$\begin{array}{r} 11.030 \\ 10.052 \\ \hline 10.948 \\ 10.320 \\ \hline 0.628 \end{array}$$

Mrs. Shackelford
 The Netherlands - 15th St. Road.
 Columbia 0810
 James W. Shackelford

1. Rust-colored ground warbler - ^{on ground}
 2. White-throated sparrow ^{in pine}
 3. Chewink ^{in pines}
 4. Black & white warbler - ^{(white stripe in}
 5. White-eyed vireo + ^{side of head, thin}
 6. Scissor summer tanager - ^{black & thin white}
 7. Purple Finch ^{on pine tree limb}
 8. May be Least Flycatcher (?) on Acacia.

1. Nashville Washburn? yellow-necked? P. 17.

7/25/29

First Bee-marten this evening in plum tree

4/27/39 - Saw beautiful little clear gold bird this AM.
The bird was clear gold the following

Cherry
with
patent

The entire body was char gold, the following
number of a number of short steps down the
apt. 11th & 12th. I saw a scalltan, also

In the wood this A.M. I saw a cat tan. Also
(9:00) golden rump & sides,

My dear
Walter

In the wood (1900)
 He had a golden rump & sides,
 back breast white throat & dark back black with
 (sides). There were two distinct white
 bars on each wing. (Golden Chukar)

James Eike

Exp. 4

B. S. T. A.
3/15/29

Line I

D₁ = 3100 mm

D₂ = 17.8 "

D₃ = 12.50 "

D₄ = 17.35 "

D₅ = 22.30 "

D₆ = 27.10 "

Line II

A rather one sang "cherry, cherry, cherry" (or "very"). He was gold-colored (both sides) with back and white underbody. The head, back & breast were gold.

In the oak tree I saw a warbler with olive back, gold rump, & tiny gold spot in the center of his crown. I couldn't see his body very well, but seemed with a yellow or gray with faint streaks.

4/27/29 — on ~~ways~~ ~~Acacia~~ saw 2 redstarts - the male & one Maryland yellowthroat



May 9, 1929

Hooded warbler

Black back, head, throat & upper
breast. Cinereous white spot

On wing, white underparts; throat -

Many black-throated green warblers & many

Ol. green back - shiny head - gray white
underbody - white spot on back

Warbler - with orange-yellow breast
and back - of qu. wings - yellow back & throat

Warbler; blue green body yellow under-
body. Black hood over head & neck top
Hooded warbler. Enclosed box. yellow
Circle on cheek about eye.
Hooded warbler

1 tiny warbler - al. green dusky wings & back. - or yellow
n. breast back, yellow wings. Dark head, yellow
on upper breast. - Parula W.?

1 redstart. - black & white striped on top & sides
1 pr. warblers - black & white line under eye. White under
black & white stripes between legs & back of legs.
black legs & feet.

5/12/29

1 warbler - slaty blue head & back - red
yellow - shoulders (between wings), yellow red
on throat, bordered on all sides by slate. Narrow
slate line below yellow throat & then yellow
breast, with red-brown center - underneath white

1 Redstart?

Blackpoll?

1 warbler - black crown & sides of head to
below eyes. Broad white line under eyes.
Bl. stripe from bill over neck on each side.
White center of breast & under body. Back

mostly black at stages. In the same way
along limb.

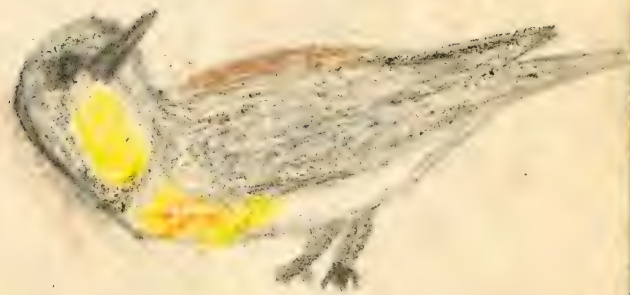
In. warbler - one warbler like a catbird -
long sharp bill - two white feathers in tail conspic-
uous in flight - white lower stomach
Tail constantly snapping & used for balancing.
Pheasant.

Blue winged warbler

Bay breasted warbler

Chestnut sided

Magnolia
Pine Warbler



Sun. May - 5.

Warbler - Gold head, neck & back -
Lower back of. gr. & black - wings bl.

with white ~~larynx~~ ^{throat} Black throat & back.

Myrtle warblers, ^{white underparts} Black-throated green under

Flycatcher - size of rob. yellow underpart
of. gr. back - "quint, quirit!" Great Crested

1 warbler - of. gr. (?) back, orange-yellow throat &

upper breast - black line around throat -
dark head - white underparts - (Kentucky warbler
Canadian "?)

1 warbler like the myrtle - but! ~~Golden-winged~~
Had black stripes instead of solid black line on
sides. Yellow spot on sides, wh. throat, belly
defined by black stripe & bottom. Light spot (?),
yellow (?) on crown. Slim. Yellow rump.

(Sandpiper?)

Louis Water Thrush.

M. Yellowthroat

Wren

Many Wood Thrushes.

Snake

5/7/29

Quails arrived this AM.

Yellow-b. Cuckoo arrived few days ago,
(over)

5/7/29.

Found yellow-b. Cuckoo-dead in garden
this morn. ~~Feathers~~ Feathers in front of chicken house.

5/8/29

Saw one this evening on clothes line.
Pulled shoulder straps of clothes for nest.
Hung up 5 pieces of string. He & wife were
in cherry tree, also male & female outside.
Female was there also. ~~He~~ I think he & she flew.
Summer Tanager in wild cherry tree, singing.
Myrtle warbler (?) in garden on ground. Yellow
bill cuckoo eating caterpillars in locust tree.
The Orioles were busy at this also.
Flocks of myrtle warblers on lot.

5/9/29

2 dog, thrushes.

Red-brown on back. Little larger than
sparrow. Plump, big dark eyes, buffy-gray.
Underneath - darker buff wash on throat. Pair
of little warblers (Mayland yellow throat)
at Snyder's.
Pair of yellow warblers at Gleng's.

4/29/29 - Monday.

7 Slaty-blue warblers with pink heads
2 black & white
4 Catbirds
2 pure redbirds
1 wood thrush

5/1/29

~~1 white-green-backed warbler or flycatcher~~, Back
ol. gr., ~~white line over eye~~, black line thru eye.
Slaty blue on sides heavily streaked with black. Slightly
pointed, seemed to have any back of ~~beak~~ ~~base~~. Sang contin-
ually & walked along limply pretty.

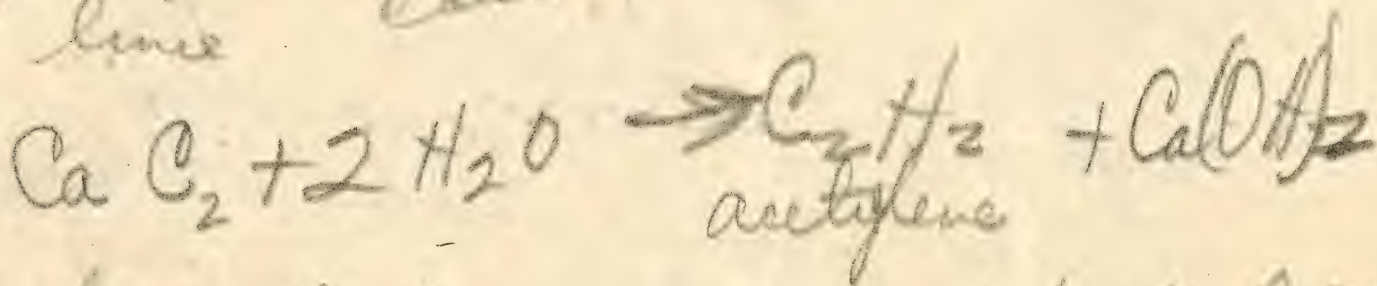
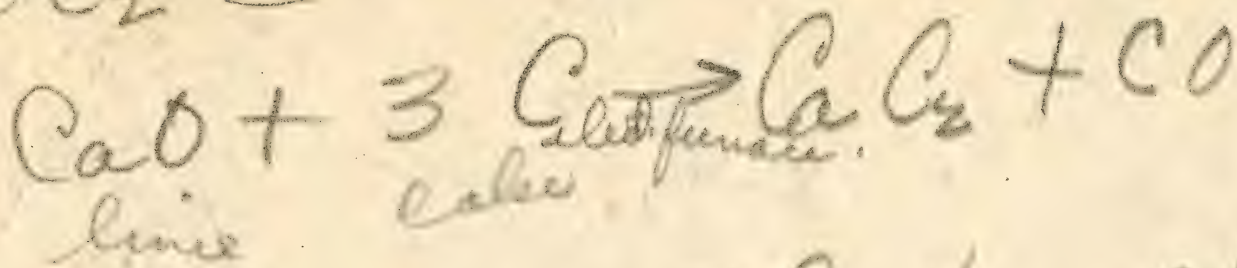
1 warbler - ol. gr. back, wings & tail. Bright
clear gold and or parts - sides of breast heavily
streaked with black or red-brown. Sang constantly -
"Z her - zher - zher - zher" Had brown line thru eye
& curved ~~bill~~ ~~line~~ under eye. ~~long~~ & slim - stood erect.
Maryland yellowthroats in bush pile.
6 or more catbirds

4 or 5 catbirds
1 warbler - ol. gr. back, wings & tail. Bright
clear gold and or parts - sides of breast heavily
streaked with black or red-brown. Sang constantly -
"Z her - zher - zher - zher" Had brown line thru eye
& curved ~~bill~~ ~~line~~ under eye. ~~long~~ & slim - stood erect.
Maryland yellowthroats in bush pile.
6 or more catbirds

1 warbler of the "thin winged" type, lower
latter, ol. gr. back, wings & tail. Bright
clear gold and or parts - sides of breast heavily
streaked with black or red-brown. Sang constantly -
"Z her - zher - zher - zher" Had brown line thru eye
& curved ~~bill~~ ~~line~~ under eye. ~~long~~ & slim - stood erect.
Maryland yellowthroats in bush pile.
6 or more catbirds

Ca C₂ —

V

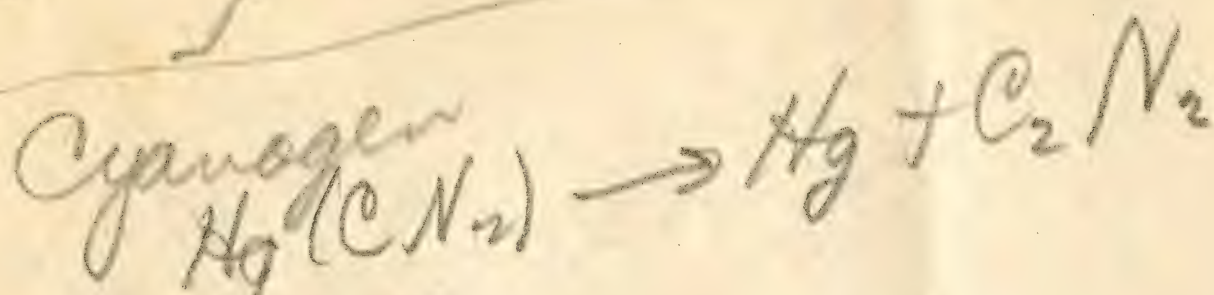
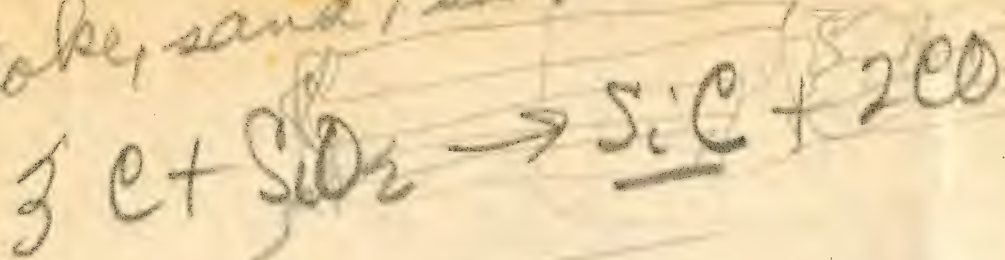


Starting pt. in manuf. of NH₃ & fertilizers,
HNO₃, explosives etc.

Carburenum —

SiC

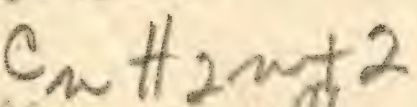
coke, sand, salt, & sawdust.



H CN —

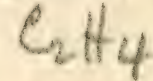
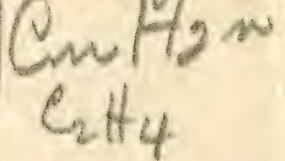
Hydrocarbons

Methane series

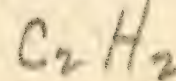
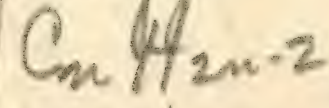


methane — CH₄

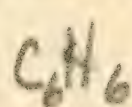
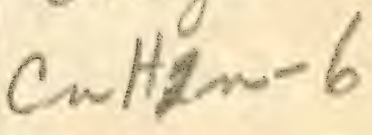
Ethylene —



Acetylene —



Benzene



Kildeer - Feb. 12, 1930
& several weeks earlier

Feb. 13 - 1930
Woodthrush

Kildeer - Feb. 20, 1930.

Hermit Thrush - Feb. 21, 1930

Fox Sparrows - Feb. 25, 1930.

Long-billed Marsh Wren -
April 5, 1930

Wilson's Thrush - April
19 - 1930. ?

Late Date - Myrtle
Warbler - Apr. 27, 1930.
A. Wetmore - May 30, 1930.

Late Date - Myrtle Warbler
May 3, 1930.

Number

Rate

Cong. Dist.

aval Service

Minority

rade

E. H. Forbush says Penill.
has no real trill - "a slow
monotonous succession of
soft sweet notes, like song of
chipping sparrow, but slower with
longer intervals between notes &
much slower" - All. of them
here sang a very rapid - sharp

& clear full very pretty - also
then beautiful, liquid, less
common "dee-dee-dee-dee"
song. Also the laughing
"wicky, wicky, wicky" song, which
I heard young ones sing

(8/10/20 - 9:35.

ated.) Matching 3-piece Vanity Set. One piece 17 x 5 in.; 2 pieces 8 x 12 in. (2½ yds. edging required.). 39¢

X67E69—Package of four-strand wash-fast Rayon Floss to embroider any one of the above numbers.—we pay postage. 38¢

Ready-Made Hand-Tinted Circular Apron



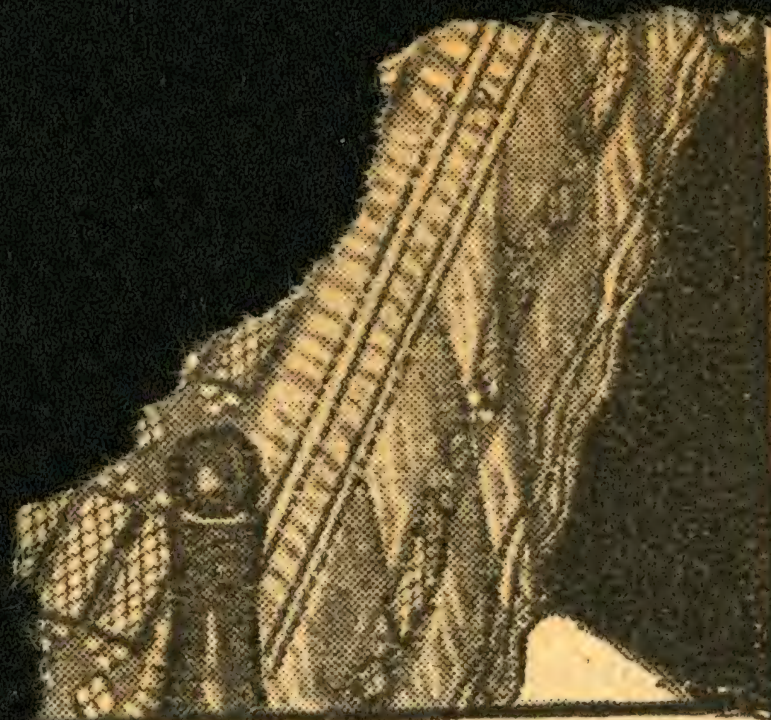
Rayon Edging 10¢ yd.
WE PAY POSTAGE

Stamped pieces of good quality natural linen color Cotton Art Cloth in pretty butterfly-and-flower design. (Edging not included. Instruction chart included.)

X67E33—Stamped Pillow Top. Plain back. 16 in. square. (Requires 1¾ yds. edging).—and w

X67E34—Scarf to match. Size about 16 x 24 in. (Requires 4 yds. edging.).....—and w

X67E35—Centerpiece or table runner. Size about 16 x 24 in. (Requires 4 yds. edging.).....—and w



For Thrifty Housewives

D and men's shirts. About 36 inches wide.

E 51E1355—All-Silk Washable Radium. About 36 inches wide. For dresses, slips, etc.

Each of the above materials comes in the following COLORS: passion flower, Castilian red, English violet, Pandora green, sunburn tan, Byrd blue, Spanish wine, spun gold, cactus rose, Jeanne d'Arc blue, Hawaiian brown, jade green, golden poppy, tan, Imperial blue, French beige, rose petal, marron glace, Zeppelin green, claret wine, Copen blue or navy blue (all illustrated on opposite page); also flesh pink, pilot blue, orchadee, sun star, honeydew, middy blue (light navy), silverwing grey, briar rose, cameo nile, maize, sherry brown, pink, cocoa, coppersheen (reddish bronze), English green, chalet red (bright rust), Monticello green, white or black.

Order by style number for material and state color desired.

OUR PRICE, Each; A yard. **94¢**
—and we pay postage.

JUST FOLKS

By EDGAR A. GUEST

THE PRIZES.

Said an old-time champion to me, as
he showed me many a prize,

Which he had won in his earlier days:

"Are they dazzling to your eyes?

You think them precious to hold and
keep, but the fire I would
throw them in

Could I only be the boy once more
with his first prize yet to win.

"These are trophies of victory, and
time was I thought them sweet.

But I'd rather be out there playing
now and facing again defeat

Than sitting here in an idler's chair
with my prizes round me lined,

With nothing to dread, and nothing
to risk, and nothing to stir my
mind.

"Oh, the game is more than its prize,
my boy, as soon you will come
to know,

The joy of the race is in running it,
and not in the thing to show.

I've cups and medals enough to
spare, but I'd give them all to
claim

The thrill of the youngsters strug-
gling there who haven's yet
won a game.

'Now I'm settled down and watch
them go to the fields to lose or
win,

With eyes agleam and with hearts on
fire they'll battle through thick
and thin,

And I'd rather be those who will lose
today, and tomorrow will try
anew,

For they still have the joy of the
game, while I am left with a
prize or two."

bonuses and stock pro
many of the Company's
were entirely eliminated
be 6.60 per cent.

A net profit of \$13,07
from the redemption or

The surplus earned du
on the values entered
amounted to \$42,863,5
sum substantial appropri
been made to further str
of the Company.

An additional \$10,000
ducted from the market
ties as a provision agai

SUN CON

"WE know ourselves so little that many think they are about to die when they are really in good health, and many think they are well when, in fact, they are on the brink of death."

That is not quite so true today as it was when Pascal penned it three centuries ago.

Popular education and readable books on physiology have helped. The popular rules of health are based less on superstition and more on science than was the case a hundred years ago.

Still, the body we live with from infancy to old age is largely a stranger to us.

Just for a test, try yourself on these 20 facts about your body. How many do you know?

They are noted from the first 200 pages of Dorsey's popular book, "Why Behave Like Humans?"

1. One-fourth of all our muscles are in our neck and face.

2. If one-third of our skin is destroyed by fire, acid or other accident, we die.

3. We have 32 teeth; eight on each side of each jaw; that is, two incisors, one canine, two bicuspids, and three molars.

4. A man 150 pounds in weight would weigh 50 pounds if he were thoroughly dried out. Our blood is 90 per cent water. Our bones are nearly half water. Conscious brains are 85 per cent water.

5. To balance our head on our spine, we use 20 muscles. To balance our spine when walking we use 144.

6. In walking, each leg rests half the time. We tire standing because neither leg gets rested.

7. With every step we take about 300 muscles are used.

8. Our body temperature is regulated and remains constant at 99 degrees.

9. We average about one square foot of surface and about 90 square yards of face.

10. Normally we take one breath four heart beats.

11. If you stay quietly in bed you save heart 20,000 beats a day.

12. A 160-pound man has about eight pints or four quarts of blood. He can lose up to one and-a-half quarts at a time and recover.

13. Your heart beats 40,000,000 times a year. It drives the blood through the arteries at the average rate of 30 feet a second. When you sit quiet it pumps about five pints of blood a minute. When you run uphill it pumps seven times as much, or 35 pints.

14. The motor mechanism with which we walk weighs about 80 pounds. Sixty is muscle and 20 bones.

15. A man can sweat as much as 10 pints in a day.

16. It is impossible to commit suicide by holding the breath, because as soon as consciousness is lost breathing automatically begins again.

17. About 50 per cent of our body is carbon.

18. The average muscle is 25 per cent efficient. The trained muscle is only 40 per cent efficient.

19. We have 2,000,000 tiny pores or sweat glands. There are 500 to the square inch on most of our body, and 2,000 to the square inch in the palms of our hands and the soles of our feet.

20. Just to keep the heart beating, the lungs functioning and the body at the right temperature requires 1,700 calories a day—enough energy to lift 200 tons a foot.

(Copyright, 1927 New York American, Inc.)

MORE TRUTH THAN POETRY

LADY ISABEL AND THE THIRD PARTY

By S. E. Kiser

THE Lady Isabel possessed
A proud patrician air,
Although the clothes in which she dressed
Were hardly more than fair.

WITHIN her gray ancestral halls
The scene was seldom gay;
The beams that rested on the walls
Were weakened by decay.

THE old earl
Wasn't feeling
well,
The words he
spoke were
sad.

But proudly Lady Isabel
Addressed her titled dad.

"BE not downcast, old dear," said she,
"The outlook's not so worse;
Good luck's in store for you and me
Despite your empty purse."

TOMORROW Prince Gazooks arrives
To ask you for my hand;
I'll be the second of his wives,
The first one he has canned.

AND he will find a way, I know,
To save our proud estate;
A fortune teller told me so,



And said, as happily he smiled:
"I'm feeling better now."

BUT Prince Gazooks came n
Gal's heart is like to bu
A movie queen from Holly
Got to his highness

OCCASIONALLY opportunity will make
man, but he can't always hold the job

ingham.
all good tires.
terms.

1920 Roadster.
just like new: fully

1925 80 4-pass.

1925 Sport Touring.

little: looks and runs like
equipped, \$895.

1925 CAR IN TRADE.

Peerless Motors Co.

Factory Branch,

17th and P Sts. Main 9850.

Also

1722 17th St. N. W. Fr. 633.

Open Evenings and Sundays.

Chevrolets and Fords Complete Selection

1925 Chevrolet Roadster, fully
equipped; looks like new; priced
right. \$100 cash, balance 12
months.

Buick 1924 Roadster, 4 wheel
brakes; car in wonderful condi-
tion. \$100 cash, balance in 12
months.

1925 Ford Coupe, in tip-top
shape; extras; priced right. \$100
cash, balance easy.

1926 Chevrolet Landeau, fully
equipped; perfect throughout.
\$150 cash; balance, 12 months.

1925 Ford Tudor Sedan, in ex-
cellent mechanical condition; a
real bargain. \$75 cash; balance
easy.

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Used Car Dept.

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REDUCED FROM \$50 TO \$1,200

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Evenings and Sundays

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In excellent shape.

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Line. 303

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\$195.

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moon tires. Fully equipped; will sacrifice.

ESSEX COACH, 1926

The motor is smooth and economical. Just out of the paint shop
and looks like new. Fully equipped. Only \$425.

1926 Hudson Brougham.....\$850
1926 Essex Coach.....450
1924 Hupp Sedan (in paint shop). 450
1924 Buick Master Touring (in
paint shop).....450
1924 Chevrolet Roadster (in paint
shop).....175
1925 Essex Coach.....375
1925 Hudson Coach.....625

1926 Ford Roadster.....\$250
1926 Ford Tudor.....325
1925 Ford Tudor.....200
1924 Ford Coupe.....150
1923 Ford Sedan.....60
1924 Chevrolet Touring.....150
1924 Maxwell Touring.....250
1924 Ford Touring.....60

Lambert-Hudson Motors Co.

1722 L St., West of Conn. Ave.

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Can Be

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Colors,

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Just How You Want
Your Motor Done,
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Each Owner Takes a
Particular Pride in
Such a Car

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We Do It

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Figure What

You Can Buy With What
We Save You on a
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1926 Chrysler 70 Roadster.

1926 Buick Standard Coach.

1926 Studebaker Big 6 Sport Road.

1927 Buick Standard Coupe.

1927 Hupp 8 Sport Touring.

1926 Chrysler Touring.

1925 Nash Special Coach.

1926 Franklin Ser. 11 Sedan.

1923 Marmon Sport Sedan.

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1922 Willys-Knight Touring ...150.00

1924 Durant Touring 50.00

1923 Chevrolet Touring (new
tires)100.00

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POT. 3551

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Cars." Large assortment. All reconditioned
standard makes.

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25 Willys-Knight Coupe-Sedan 650
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24 Red-Durant Sport 225
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24 Light Six Studebaker Sedan 450
23 Dodge "Collegiate" 125
26 Ford Tudor 385
26 Overland "6" Coupe 550
24 Hupp Touring 398
24 Buick "Cabriolet" 625
26 Pontiac Coupe 595
24 Durant Sedan 250
23 Rickenbacker Touring 425

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Some with rumble seats. Late models.
Right prices. Any demonstration. See
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1924 45 Buick Roadster \$590.
1925 45 Buick Roadster 725
1925 Advanced Nash 850
1927 Nash Roadster 1,250

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Something new to offer you! Only driven
2,834 miles—and sold under our written
new-car guarantee. A chance to save a
couple of hundred dollars in buying a
1927—NASH—235
Coupe. Done in Two-Tone Duco,
Fully Equipped.

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Used Car Department

1926 Chevrolet Coupe.....\$495
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1924 Maxwell Touring..... 225
1927 Dodge Coupe..... 775
1926 Ford Coupe..... 325
1925 Maxwell Club Sedan..... 525
1925 Hup Coupe..... 525
1925 Essex Coach..... 450
1926 Overland 6 Coach..... 600
1925 Willys-Knight Sedan..... 740
1925 Flint Touring..... 300

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1924 Ford Coupe
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1925 Ford Sedan
And Ot

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Chrysler 70 Coach
brand new; in e
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Packard Touring
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Many other

UNION S

51 Eye St. N

Hupp Tour.
Jewett Coach
Durant Coupe
Durant Sport
Star Sport
Dodge Tour
Chandler
These
and are

T

His mask was fully formed, but light in color, with yellow apparently showing thru in streaks. He was very busy hunting in the small alders on the edge of the pond, together with several relatives that I couldn't see. Once he dived into the water with a splash.

Saturday, Sept. 28, 1929.

31st. Coming back from Occoquan this A.M., I killed a little foot-long copperhead snake in the woods back of the cellar. The chickens were after him. In striking he left the ground a foot.

Went down in Bubba's to meet Bob to get cake for my birthday. Killed 1 cooper's Hawk with .22 rifle, circling him & cornering him in the branch opposite the "Little Bridge". While following him thru briars I killed a large rabbit in his bed.

Sun. Sept. 29, 1929.

Got a shirt, necktie, 3 pairs of socks, pr. pajamas, 1 pr. garters, 1 bird guide by Reed, & 1 Wild Flower guide by Reed.
Sun Oct. 6, 1929 Joe shot up the last of my bullets. Saw a squirrel back of pond.

Mon., Tues., or Wed., Oct. 7, 8, 9, or 10, 1929
Saw first southbound white-crowned sparrows on path just past big oak. That one was even bird at first. Must have been female or young, since there was no black on head.

Friday, Oct. 11, 1929.

Saw a number of white-throated Sparrows near road this evening, about 4:30. In leaves, but flew up. Tried to trace them into whistling, but the one I tried would only chirp. His lores were almost lemon-yellow. I heard one of these sparrows sing this A. M. at Canney, about 7:00.

late Doye

Saw a yellow throated vireo several days ago, & have seen hairy woodpeckers several times lately.

Saw a very busy bird in the old willow(?) tree in front of Bob Weyland's store last sat. It seemed to be a female blackpoll warbler or perhaps one of the vireos.

Sun. Oct. 6 or 13, 1929.

Killed foot-long young copper-32nd head in side of old pine stump beside another stream from Castle woods to pond.

Killed gray squirrel in woods back of house. Killed 1 rabbit just over hill at dark, & could have killed 2 more.

Sun. Nov. 3, 1929

Have seen several dozen kinglets lately, the first ones about two or 3 weeks ago, on the hill above Bubba's branch. Most of them were golden-crowned.

Saw several red-breasted nuthatches at the pond about 3 weeks ago. I believe I have seen them here other winter but am not sure.

Have seen the usual flocks of nuthatches, titmice, chickadees, black-&-white creepers etc., lately.

Have not seen that Kennit (?) Thrush for about 2 weeks. He stays for over a month in the hickory trees down in the pines near the road.

Saw what I believe was a Veery or Wilson Thrush about 1 week ago.

Many Field Sparrows around lately. Flocks of Robins have been around lately, mostly coming from the ~~area~~ north, where they went some time ago. Many bluebirds around lately also, in flocks.

Fri. Jan. 24 - 1930

Two (2) inches or more of snow has been here about 2 weeks. It's all ice underneath. Saw a large

flack of robins in the pines
beside the road this eve, coming
from school, about 4:45.

On the last piney hill about
5 of them were eating holly berries.
Sat. Jan. 25, 1930

Saw one large robin at
Morgan's gate. He was very
friendly, and kept chirping, acting
as tho he knew me. He may
have at that. He was eating some
kind of berries off a tree, I forgot
what kind.

I saw a cute little golden
crowned kinglet in the cedar by
Peggy's garden ~~up~~ some weeks
ago. They come around once in a
while.

Mon. 27, 1930. Jan.

Snow about 1 to 2 ft. deep.

Mid year tests started 23 last
Thursday.

Thurs. 6, Jan. 1930.

Heard a tufted titmouse

whistling in the big trees
on G. H. Campana this
morning. He was whistling
just like the one I heard
up here last year. He sounded
like a red-bird.

Fri. 7, Jan. 1930.

Saw large robin today,
in pines.

Sat. 8, Jan., 1930.

Many tufted titmice and
chickadees, also up thatches
around today. In hundreds of
cracks on the Oak tree there
are acorns which they have
opened after sticking them
tightly. They were singing and
fussing and came to the ground
often after acorns. They are
flying back & forth everywhere.
If it were not for this cold
South wind it would be nice
here today.

flock of robins in the pines
beside the road this eve, coming
from school, about 4:45.

Wed. 12, Feb. 1930.

Heard Kildeer calling
this evening as he flew
over. I heard one several
weeks ago, also. Sounds
like spring.

Thurs. 13, Feb. 1930.

Heard a wood-thrush
singing in back of the
tomato. Canary a 7:00 A.M.
It was raining and the red-
birds were whistling.

Sat. 15, Feb. 1930

Started to snow this
afternoon around 2. Snowing
fast as the dickens. Stopped
about 8 or 9. About 1 in. of snow
in most places, very light.
Wet ground from thaw melted
most of snow.

Sun. 16, 1930 - Feb.

Mary came home yesterday
eve! It's pretty cold today,
and the wind blew this
A.M. Mary left at 6:45 to
catch 7:15 train. Found out
later it didn't leave until
7:38. Moved back to its
old time.

Wed. 19, Feb. 1930

Bluebirds singing this
A.M., as were white-throated
sparrows, fieldlarks, titmice,
blackbirds chirping.

One of most beautiful spring
days I've ever seen. Not as
a summer day. Watched work
on new school building.

Thurs. 20, Feb. 1930

Temp. 76° in Wash. Broke
56 yr. old record. Same birds
as yesterday. Bluebirds singing

happily. Killdeer flying over-
head, same as some weeks ago
before snow. Their calling sounds fine
Fri. 21, Feb. 1930.

Hermit Thrush { Boots caught a small
thrush this A.M. A hermit, I
guess; I'll have to look it up. Little
devil! Bluebirds were building
in paper boxes in Horner's Sand
this morning. Carl saw wild
geese go north several days
ago. Two pairs of red birds
(Cardinals) were chasing each
other around on the lot this eve about
6:00 or later. They didn't seem to
have definitely mated as they
did not keep in separate pairs in
their love-making. The last
three days have been some
of the best I have ever
experienced.

Frogs have been singing
since Thurs. or Wed. eve.

Sat. 22, Feb. 1930.

Robins singing. Blackbirds
really singing this time, down
in Thompson's.

Snowbirds singing their
spring love song today.
One was in Metgers garden
singing a little hesping wing
trill, then flew gaily into the
grass.

Spanrows & bluebirds
singing and nesting.

Redbirds singing, also
chickadees, titmice & nuthatches.

Crows everywhere.

Sunday 23, Feb. 1930.

Robins & other birds
everywhere. 50 or 100 robins
eating on ground in Bubbi's
field. Little frog jumped
in water opposite red mud in
field, when I came back from
going out to gate for Carl,
Mary, & Joe.

Swamp in Aitkin County, Minnesota -
old - bird paradise.

Monday 24, 1930, Feb.
Spring again after slight
cloudiness yesterday, with
mist. Birds everywhere.
Thousands of frogs. Papa
heard a hawk screaming
today, not whistling. Killdeer
singing. Read bird magazines
in Congressional Library today.
Especially the "Auk." Read fine
article on Connecticut auto
warbler. It told of finding nest,
eggs & mother in Minnesota.

Thundering, and lightning
flashes since about 8 or 9. It's
now 10:50 P.M. & has been raining
about $\frac{1}{2}$ hour. A spring shower.

Heard a wood-thrush
singing again this ~~morning~~ morning.
Heard a dove cooing this
evening, somewhere near
Gard's. The first one I've
heard this year, and a
good sign of spring.
Saw 3 large ducks flying

north about 7:00 A.M., over Babbs'
gate. Looked creamy yellow underneath.

Tuesday 25, 1930 - Feb.

Heard a hawk screaming near
pond about 6:55 A.M. as I went over
hill. Birds singing everywhere.
Killdeer & Bluebirds. A robin
was singing his spring song in pacts.
Frogs are singing constantly.

Tues. or Wed(?) Saw a large
number of birds in march
near culvert at road about 7:00 A.M.
Among the cardinals were many
birds I took to be fox sparrows
altho they seemed much larger. They
seemed almost a red, so bright
was their brown. Their breasts
were heavily blotched. Not being
in a hurry I watched them. I
finally became aware of a rabbit
"froze" in a little open space. I
tossed a rock at him which hit
a small alder tree above him,
drapping a ft cloud of yellow

pallen dust which floated away. I tossed another, and he still didn't move a muscle. I then went off and left him.

The birds resembled chowwinks in their build, but, altho I couldn't see them very long, I am sure they were not.

I wonder if those flocks of birds I've seen this winter could not have been Horned Larks or Prairie Horned Larks? I saw them many times over the corn fields, always flying a good ways up, so that they could only be seen as having grayish under parts, or brownish. The large flocks always gave forth a loud twitter, somewhat lilting & musical.

Thurs. March 6, 1930

Have been home since Monday. New shoes wore a blister on my left big toe Monday a week ago, & it

kept getting worse. Sat. The doctor saw it & had me put something like antiphlogistine on it. It drew out about a tea-spoon full of ugly pus. But my toe is far from better.

While sitting on the front porch today, a cute little song sparrow lit on a post in the garden fence, by the forsythia, and sat there a minute, showing his little shield. The mockingbirds have been visiting their water pan every few minutes. All winter only one came, then the sparrows & cardinals joined the "water line".

Now there are 3 mockingbirds here. Fri. March 7, 1930-

Nasty day today. Driest east wind & driving rain (drizzle). Cold & blustery, a typical March day.

On a "trot line" this A.M. Carl caught a large "cat fish" ^{and} that weighed around ^{26 lb. 5 oz.} 33 or 35 lbs. It was a giant; with the head off, Arvilla had to cut it in two pieces to put it in a large roaster.

March 24, 1930 - Mon.

Doves have been cooing now for days. Snowbirds have been singing their little twittering songs, preparing to go north. I haven't seen any for some days now, perhaps they are gone.

Frogs are singing by the millions, apparently.

March 25, 1930. Tuesday.

Holiday today - Founder's Day. Foot has gone bad again.

Saw several chip sparrows singing in the oak tree & cedar, & down in black cherry tree front gate. Song sparrow singing on garden fence almost back of stable.

Big male cardinal singing in locust tree. A big starling certainly looked beautiful with the sun shining on his metallic feathers.

Violets are blooming in Carl

garden - The forsythias have been blooming about a week or two and are wonderful, especially when the bright sun shines on them.

For the last 10 or 20 minutes. (It is now 1:05 P.M.) a bird has been calling vigorously, almost harshly, "shee weet" "shee weet" over and over continuously. I thought it was the mocking bird imitating a flycatcher & told mama so, but finally I went out, and away flew Phoebe out of the small wild cherry tree. He went to the one down at Babbe orchard, and then came back to a little apple tree by the raspberries, where I identified him. He's still screaming at the top of his voice.

A flicker just flew by. At noon I watched one fly for about one or two miles.

(7/11/1930)

over Bogies, over our woods, &
finally come to rest far over
in meadow on Leary's Old place.

A meadow lark was singing in
Zub's orchard this A.M.
Saturday, March 29, 1930

The phoebe is still here. I
heard him calling this A.M. He
must be lonesome without even
another male around, let alone
his mate, who'll get here later.

I wonder if he came north alone,
or did he just drop off here at his
old home. He seems to know
the place pretty well.

I have something else
to wonder about now. Out in
the hammock now, about 2:15 or 2:30 P.M.
I heard "skwip, skwip." Each
note came out rapidly, but one
could not say sharply or harshly.
Up in the locust tree was
a small, slim, bird, about
the length of a sparrow or perhaps
shorter; slaty grey or black on

the back, head, wings, & tail.
Underneath grayish white,
but nearer grey, with dull
black stripes or blotches (i.e.
they were not clean cut lines) several
rows wide, starting at the top
of the breast (or base of neck) and
extending down sides to
legs or there about, close
up to wings on sides.
Slight indication of what
might have been a faint yellowish
grey collar about throat, but
probably was not. Flitted &
rapidly about, hardly
ever remaining still for an
appreciable length of time,
changing position every second,
dashing back & forth from
limb to limb, & tree to tree,
continually calling "skwip." He
became interested when I answered,
but soon flew over to the
woods or apple tree. Repeatedly it
caught flies, gnats, etc. on

the wing with all the dexterity
of a flycatcher. Picked something
off a limb once. Had two indistinct
wing bars, very narrow, white,
might have been just underside
of feathers. Unaries of one wing
seemed somewhat out of place
at first, but his flitting restored
them nicely. His eyes were
black & shiny, I believe, & I
think he had a slim bill.

He was in the locust tree, the wild
cherry, small cherry tree by corner of
porch, in apple tree in garden, etc.
Slightly like female blackpoll. Kirtland Warbler

A pair of chickadees was in the
garden & front yard for a while, &
one then chased the other into the woods;
I guess they'll be mating before long now.

Sunday, March 30, 1930

Went out for long walk today
for first time in 4 weeks. Partly
cloudy today, sun shining bright in

between.

Just before going down last slope
to pond, I saw a number of little
birds, high up in the pines. After
looking at them I decided they were
pine warblers, except I see now
that ^{Reed} ~~Darwin~~ shows no deep fork in
the tail. They were a bright (i.e.
heavy) gold on head, throat, neck,
breast and underbody, and back
also I believe, all overshadowed
with a greenish cast - underbody
from legs back grey-white -
alive green wings & tail - tail deeply
forked, about $\frac{1}{4}$ out $\frac{1}{2}$ inch or so - females
there also - paler.

Saw them in several places around
in woods, also one in back of house
this eve. about 5:30.

Saw a few white & red-
breasted nuthatches, going around
& around the trees. One "reddy"
was hacking away at the bark
at the edge of a lichen on an oak.

Many bull-frogs croaking,
but very poorly as yet. One, who
was tuning up for the first
time probably, sounded like
a large hen cackling. A large
slider upon a log in the pond. He
vacated when he saw me.

Hundreds of small lamprey eels going up ^{stream}

I saw a beautiful fox-
sparrow on this edge of the
pond. He was very bright &
very tame. Two brown creepers
many titmice, chickadees, etc.

Aphoe which I think was
probably the same one that's
been around the house was at
the pond all the time I was there,
catching insects almost off the
surface, and continually
calling "skew-wet, skew-wet."

I went over towards the falls
looked back to the falls
down pine, and saw two
little Carolina wrens in

the leaves at its base. I
looked thru the glasses again
and saw a small bird
fly up into a tree. His
beautiful oval golden rump
identified him as a
myrtle warbler. He flew
about, but when I got there
later I couldn't find him
anywhere in the woods.

The marsh was thick
with song sparrows,
running on the beaten
down grass in the edge of
the grass (marsh or water?)
7/1/30

April 4, 1930 - Fri.

I shot I saw a brown thrasher
pitch into the little marsh beside
Walter Harris's.

April 5, 1930 - Sat.

This AM. in Occoquan I saw
two purple martins flying
over the river, one swooping

✓ down and getting a drink.
Saw another one over pond
this noon. Cal. that he saw them
a week ago but I did not.

✓ Dozens of Kinglets and several
Pine Warblers in the pine tops by
the pond.

Hundreds of song sparrows
and many tree sparrows singing
& walking in the marsh on the
dry grass and in the water.

✓ Heard a weak, thin song
near pond, repeated several
times at intervals. I couldn't
locate any singer, but that it
might have been one of Kinglets
singing a love song. If so I never
heard one sing like it before. "Sweet,
sweet, ~~few~~ few, few, sweet," etc.
It seemed typical of warblers or
some birds of their kind.

✓ At falls I heard a pretty
song and knew it was a ~~chamberlain~~
✓ After a moment I placed
it. The Louisiana water thrush,

whom I saw for the first
time a year ago yesterday,
was there. After a few moments
I saw him bobbing among
the tree roots watching me.
He walked in the shallow water
as it went over the tiny falls,
walked sideways along the
steep banks, ducking under
the water for food.

Later the phoebe, who
has been singing down
here all morning, dived
at him as ^{he} went back
under an overhanging
bank. They sat near each
other a moment, then phoebe
flew off & Mr. L. W. Thrush
went about his business.

✓ Saw long-billed marsh
wren in marsh about noon.
✓ One slider out in pond, two
in marsh. Hundreds of
Robins. I wish there were
thousands.

Several larks and robins on way to Decoquan.

Quite a few flickers in woods.

Heard a jay - bird - first in long time.

Heard sea-gulls screaming & flying out over land for first time (March 29-30)

Sat., April 12, 1930.

A brown thrasher was singing beautifully in the top of the persimmon tree; he put on a special number for me. He was in the bushes when I came back. First definitely.

One warbler - black & blotted sides - Gold throat & chest - black cheeks & face - white lores, ol. green or grey back - long bill - two white wing bars & white line over eye - white outer tail feathers.

sang continuously in pines - "which, chirp, chirp, chirp, whist" or notes to that effect - very pretty.

Golden Yellow-Throated Warbler first I've ever seen that I know of.

Several more around in trees.

April 13, 1930 - Sunday.

A Black & White warbler singing - "se-wet, sweet, sweet" sometimes speeding up.

Many chickadees & Flickers, several downy woodpeckers.

About a dozen or more Louisiana Water thrushes going thru their courting in the marsh far above the pond. Chase each other about - one limb in a big maple, about 15 feet from ground seemed a favorite. Several would sit on it and walk up & down, bobbing

about, singing & fussing.
Almost like flickers.
Darted in & out of large
rose bush, up & down
swamp, to fall & back-
singing & calling all the
while!

pt.
8/24.
Snake
water
snakes

Killed the small snake
that I that I crept yesterday.
About 8 got away
from me, all water
snakes. My "snake-
eyes" weren't working &
I wouldn't see 'em until
they disappeared in water. Caught
one 5 feet yesterday.

Took pot shot at 4 ft.
water snake on bank on this
side of pond, just as he
flashed out of sight. Got him coming
back. Although had life enough
to slip off stick, I'm sure I got
him.

Saw Brown thrasher

today. Also another Yellow-
throated Warbler!

X Heard the first whip-
poor-will singing tonight.
First one last year was April
3. He's late.

April 19, 1930, Sat.

Coming back from
Wood Bridge. - heard a number
of ^{snakes} rattling in haves - all
flew away in short pines
over hill except one -
very tame - resembled
very - but kept back
turned all time so I
couldn't see chest - seemed
smaller & slimmer - dark
brown back - large black
eyes, long slim bill. Hopped
& flew from limb to limb,
but I couldn't identify him.
X Saw about 6 or 8

wild canaries come flying
north into woods. Lit
by old cellar. While
waiting for "Bob" Breanna
to get a cake I heard several
X L. Water Thrushes singing
over in Bubbs' marsh, near
Beards. Several hawks
X About 6 or 8 around house
at noon. Saw beds of
violets across from
little bridge in hollows -
so thick they formed a veritable
carpet - seemed a purple
haze - Saw several
X "shunk Cabbages" I think -
X acres of in up railroad track
Down in Mc'Mahan's
X woods saw many Anemones
or wind flowers, pure white
X intermingled with a great many
X lavender hepaticas or liver-
worts. The effect was very
charming. Some seemed to
come from same bush;
on old road across from spring.

April 20, 1930 - Sunday -
Saw Wood Sidge play
first game of season - beat
Dumfries 16 to 7 at Dumfries.
Jeff & Avery pitched.

Phoebe was in woods this
eve. Kept going "pit-pit"
at intervals. Caught a
big bug an inch or more
long. Beat it on one hip,
then on another, & finally
left part hanging on limb.
X Several myrtle
warblers around in yard,
& in woods. Bl. & white
warblers singing.
Thrashers in back
of chicken houses. One
in woods this A.M. kept
calling "sow-wat, sow-wat."
I answered & he appeared
interested. Same happened
to these two & when they
were in garden, running

across potatoes.

In bushes back of chicken house saw what I thought was a house wren, but instead it must have been a Carolina wren. So dark I couldn't tell for sure.

Several hawks today. Many wild-canaries.

Seagulls screaming tonight. A flock of about 50 ducks went over, headed south, then back over the house & south again. Very low - sounded like strong wind - calling and quacking low and clearly. One went "gagg, quag, quag" directly over house.

Whippoorwill singing tonight as every night, but only for a short while.

Aug. 4, 1930 - Heard starling and whippoorwill on garden fence barely audible at times, & then only at times.

April 21, 1930.

Nashville Warbler.
Myrtle Warbler.

April 22, 1930.

Yellow Palm Warbler - first labeled this a Nashville, but see now it couldn't have been.

Dark gold underbody; darker streaks on sides - greenish-gold lower back; and olive-green back and sides - red-brown crown - sang "sa-widdy-widdy-widdy," in a weak voice. Ate an insect. "walked" from limb to limb. Pumped tail.

Louisiana water thrushes singing and hunting.

Indigo and Newts.

Maryland yellowthroat in tangles.

Purple Finches.

16 to 20 birds - size of canaries. Males deep rose-red on head, neck, and throat, and rump. Backs rose.

underbody gray with a rose-flush.
Females gray with rose flush.
Carried on continual chatty-like
twittering in top of tall oaks. Were
preening themselves constantly.
Since they flew in from the
south, they may have just been
finishing their night's flight
and were resting up.

They flew, a few remaining in
oaks, later following others.

Soon found entire flock
feeding in a beech tree, eating
the catkins, flowers or what ever they
are.

With them were some white-
throated sparrows which I had a
terrible time identifying, looking up at
them from below, and not expecting
them there. I took these notes:

Larger birds, like chipping sparrows they resembled
them somewhat in posture, greyish; yellow
lores; brown tail, forked; snow white
throat set off by black necklace or line
shading off. No streaks on grey body.

long tail. white superciliary line.

Females(?) - heavily spotted underbody;
white line over eye.

I possibly was getting the females
confused here, since a bottom view
does not reveal distinguishing marks.

All of these birds were very tame.
I left my rifle at the base of the
tree, climbed up among them, propped
myself in various positions, examining
them and taking notes. They fed
on around me, were paying the
least attention ~~attention~~ or becoming
at all frightened. I could not
manage to get above them, as
they were then feeding in the top
of the tree, mainly, by now.

They fed for about an hour
while I watched them, and
were still busy when I left.
The leaves beneath the tree were
liberally covered with droppings,
and with parts of flowers dropped.

Nashville Warbler - I have this written down, but now at the date of copying (Dec. 26, 1930) - I do not know but what I may have meant a yellow palm Warbler. However this may have been a Nashville. The first one today was a mistake.

No Date - on back of page from April 27, I have found 50 notes. Then the next page has these notes at top, and then April 27 & notes from that day. I remember these dateless notes, taken while on way to road to get paper. Probably only 27, and date was for a second trip, to pond.

Black-throated Green Warbler.

Palm Warbler (yellow palm) - sang "sweet-sweet-sweet-few-few."

Pine Warbler

Black & White Warbler

Wilson's Warbler? - looked very much like

Female Bay Breasted - seemed similar, perhaps was female chestnut-sided,

with some chestnut on sides.
Yellow-Throated Warbler - sang "chee-ee-chee-ee-chen".

Prairie Warbler.

Myrtle Warbler.

Ruby-Crowned Kinglet - scolded like a wren - "skit-skit-skitt-t-t."

April 27, Sunday.

First House wren of season singing by persimmon tree.

A vireo singing like "Mary-De-la, Come here," as we used to interpret it. Yellow-Thr. - June 13, 1930.

Two Parula Warblers in the top of a tall maple in marsh, singing constantly in their sneezing, tinkling way, "whee-e-e-e-e-zah!"

Six or eight Purple Finches in top of a maple in marsh eating. Remained there all the time I was there. Not very active. Some birds with them as before which I thought might be pine siskins, as they

resembled female Finches but were marked differently below, I've forgotten just how.

Louisiana Water Thrushes in marsh.

Titmouse singing their loud cheerful carols!

One woodcock - jumped in marsh. One Myrtle Warbler - by pool back up in marsh - near tree with finches. Caught flies right over my head. Flew and darted about from perch to perch, in Alders, on maples, sycamores, etc. Sang constantly a sleepy "whit-whit-chucky, chucky, chucky, chuckyou."

One brown Crane - or heron.

One Kingfisher.

April 29, 1930.

Heard a warbler sing at 6:45 P.M. over hill. Heard same warbler singing in pines over hill while coming from train. That at first it was a

yellow warbler, but on better view saw he was a prairie warbler. Sang "zutch-zutch, utch-utch-utch;" very rapid - loud, clear, very queer, wry & flute-like - sort of twanging.

Black & white warblers also.

May 1, 1930.

at Georgetown Md.

Cardinal, English sparrows, starlings, Crows, robins, swallows, swifts, chip-sparrows - etc.

Also several Wood-thrushes. Many catbirds - first I've seen this season.

Great many Yellow Warblers - in trees, bushes, everywhere, mainly in upper parts of trees, never still, constantly flitting from place to place.

First of year for me.

Many white-throated sparrows.

All seen on car track back of Biology lab. up to bridge a track. Also in bushes back of lab.

at home - same day.
Many Chewinks, robins, white-
throated sparrows and thrashers
scratching in leaves. A number
of Flickers. Catbirds.

One warbler sang "whet, whet, you
whet" or "sweet-sweet, you sweet,"
or again "whet, whet, you whety".

Traveled rapidly. Too dark to see.

Perhaps a Hooded Warbler? Have seen same
traits there several times later in summer.

Heard Whip-poor-will.

Birds late this year - Scarlet
Tanager, Bee Martin, & Redstarts.

Swifts & Swallows - some
seen for first time Sat. about two
weeks ago.

Saw first ticks 2 or 3 weeks ago.

May 2, 1930.

Several Bee Martins or King
birds here this evening about
7 o'clock, calling to me, telling me

know they've arrived at last.

Yellow Warbler in apple tree
this A.M., about 6:45.

May 3, 1930.

Redstarts - here at last.

Chestnut-sided Warbler - male.

Black & white Warbler.

Yellow-throated Vireo.

Oven-birds.

Hooded Warblers.

Chewinks.

Myrtle Warblers.

Black-throated Green Warblers.

Yellow-billed Cuckoo.

Summer Tanager.

Hawk

Crow

Prairie Warbler.

White-throated Sparrows

In the orig. I wrote this in red
pencil; partly because the pencil
was hardy, partly because it was
somewhat of a red-letter day in
regard to species seen.

May 4, 1930.

1 yellow warbler.

one yellow-throated Vireo eating -
Tent Caterpillars in apple trees.

Wood(?) Thrush.

Louisiana Water Thrush
Vireo.

Louisiana Water Thrushes

Male Maryland Yellowthroat.

Another " " " " in
skunk Cabbage & briar patch.

Parula Warblers - one in

maple tree, others in around in
woods. Sang constantly "wee-wee-
ee-geah" sneezing, bubbling sound.

3rd.
Snake

{ One 2 1/2 foot water snake.

Red-eyed(?) Vireo - "cheer-up-where
is it - cheer up there it is."

Male Redstart.

A number of Black-throated Blue
Warblers - across logs at falls in bunches,
drinking. One high in oak - catching
insects on wing - picking them off young
shoots - running down limb - spreading
tail like redstart. Indigo Bunting - Carolinian

FALL 1926 - 16 squirrels - 3 quail
1928 - Middle of June - end of July - 17 year
locusts

Fall & Winter - 1928 - 68 squirrels -

March 1928 - 4 ft. marsh hawk - 83 yds.

Spring 1928 - Baltimore Orioles -
raised 1 young male & 2 females.

Aug. 12, 1928 - 8th snake of season - 6 ft. black.

1927 record - 13 snakes -

1928. - Indigo Buntings - nest
along path to road.

Aug. 12, 1928 - Steady rain for days lots of
damage.

Aug 18, 1928 - Rain - Orioles back
1 hawk, 40 yds. snugging turtle - 1 rabbit.

Aug 19, 1928 - Shot 2 hawks -

Sept. 1, 1928 - 1 squirrel

Sept. 1928 - 1 water snake - total 9 to date.

Oct. 13 or 20 - 1 black snake - total 10 to date.

Oct. 27, 1928 - Crippled 1 squirrel in gum tree;
Killed 1 ~~two~~ rabbit - 1 hawk.

Nov. 1, 1928 -

First white-throated sparrow.

Nov. 28, 1928 - Carolina Wren on path.
"Golden (male)." (male).

Redstart here last summer.

Orchard Oriole " " "

Summer Wren " " "

Flocks of five birds - warblers,
nuthatches, creepers, chickadees,
& woodpeckers.

Jan. 6, 1929 - Dec. 1, 1928.

1 rabbit near pond. 1 Red Fox
in Horner's - Fine work by Teddy.
Luppy was along but got off
trail.

1 rabbit - caught by Carl first.
Have killed 10 rabbits, 7 squirrels,
& have seen 3 squirrels.

Sat. Dec. 29, 1928

Chickadees - white-breasted nut-
hatches on path to road.

Jan. 5, 1929, Sat.

Watched 2 quail & sharp-shinned hawk

Jan 19, 1929, Sat.

Bluebirds & starlings singing in
garden - sparrows, wild-canary,
& Woodthrush - "late-spring" weather

Thurs, Jan. 24, 1929.

Nuthatches, chickadees, & tit mice

on workhouse road.

Tues. Feb. 5, 1929

Golden-crowned Kinglet on
road near lower gate.

March 16, 1929, Sat.

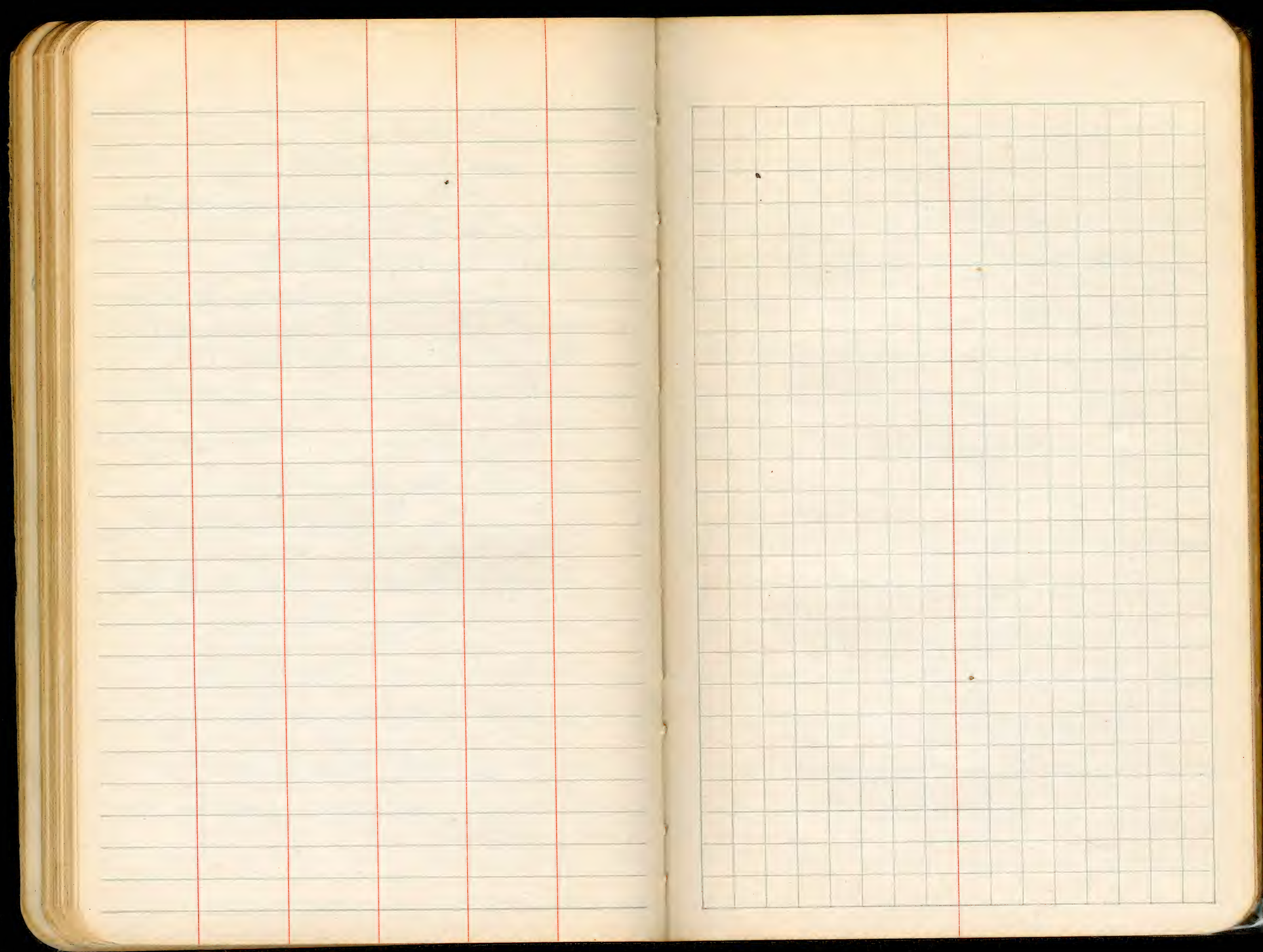
About a dog. flickers, the same
no. of yellow-bellied sapsuckers, 6 or 8
downy & hairy woodpeckers up by
castle woods.

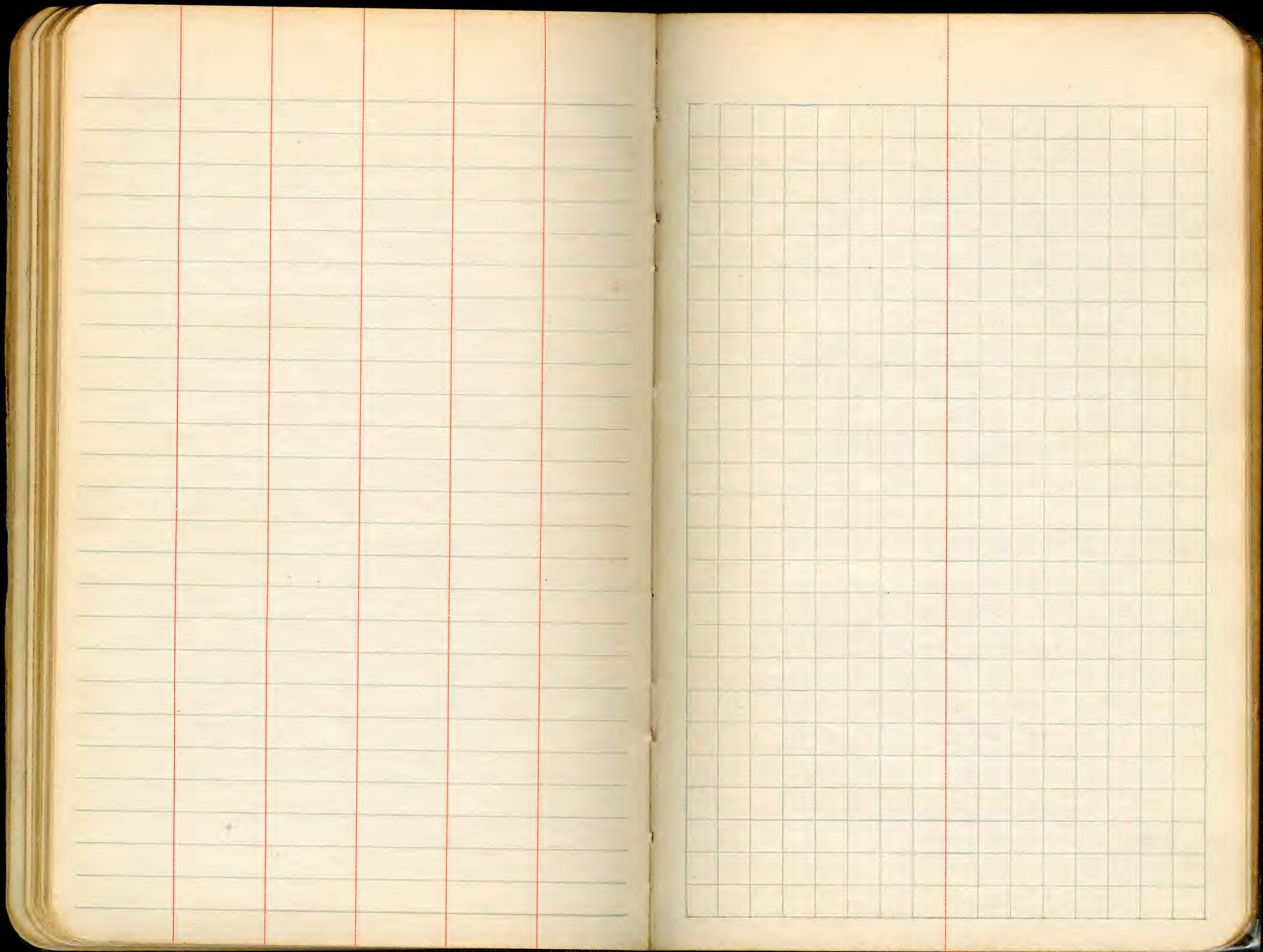
March 17, Sunday.

1 sapsucker in yard.

March 23, 1929, Sat.

7 mch day - Sparrows, juncos,
wild canaries, & family everywhere
Blackbirds, jays & flickers at pond.





Month Trees Blooming Flower

March { Willow Soft-silvery-gray catkins
 Elm { White Drooping clusters hairy-red
 Slippery - Fat-tan wooly buds - Gr. bell-shaped red
 Aspen - large-toothed - Red catkins
 Maple - Silver Br. bell-shaped

Maple-Red
 Elder-Box
 Poplar-Lombardy
 Bassam

April { Cottonwood
 Asp - Quaking
 Balm of Gilead
 Poplar-White
 Maple-Norway
 Birch (most)
 Hornbeam
 Ash-Blue - purple stems

Maple { Sugar
 Sycamore
 Oak-Red
 Ash-Green

Mo. Trees

Oak-Black
 Oak-White
 Beech
 Hickory
 Butternut
 MAY
 Most of
 Trees
 bloom
 Ash { Red
 White
 Maple-Striped
 Tulip
 Birch-Gray

KEITH'S RAILROAD CURVE TABLES.

Published by KEUFFEL & ESSER CO., New York.

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HOW TO USE KEITH'S TABLES.

EXAMPLE.

Wanted a Curve with an Ext. of about 12 ft. Angle
of Intersection or I. P. = $23^{\circ} 20'$ to the R. at Station
542+72.

Ext. in Tab. IV opposite $23^{\circ} 20' = 120.87$
 $120.87 \div 12 = 10.07$. Say a 10° Curve.

Tan. in Tab. IV opp. $23^{\circ} 20' = 1183.1$
 $1183.1 \div 10 = 118.31$.

Tab. V correction for A. $23^{\circ} 20'$ for a 10° Cur. = 0.16
 $118.31 + 0.16 = 118.47 =$ corrected Tangent.

(If corrected Ext. is required find in same way)
Ang. $23^{\circ} 20' = 23.33^{\circ} \div 10 = 2.3333 =$ L. C.

$2^{\circ} 19\frac{1}{2}' =$ def. for sta.	542	I. P. = sta.	542+72
$4^{\circ} 49\frac{1}{2}' =$ " " "	+50	Tan. =	1.18.47
$7^{\circ} 19\frac{1}{2}' =$ " " "	543	B. C. = sta.	541+53.53
$9^{\circ} 49\frac{1}{2}' =$ " " "	+50	L. C. =	2.33.33
$11^{\circ} 40' =$ " " "	543+	E. C. = Sta.	543+86.86
	86.86		

$100 - 53.53 = 46.47 \times 3' (\text{def. for 1 ft. of } 10^{\circ} \text{ Cur.}) = 139.41' =$
 $2^{\circ} 19\frac{1}{2}' =$ def. for sta. 542.

Def. for 50 ft. = $2^{\circ} 30'$ for a 10° Curve.

Def. for 36.86 ft. = $1^{\circ} 50\frac{1}{2}'$ for a 10° Curve.

(These tables are published in Field Books of
KEUFFEL & ESSER CO., New York, N. Y.)

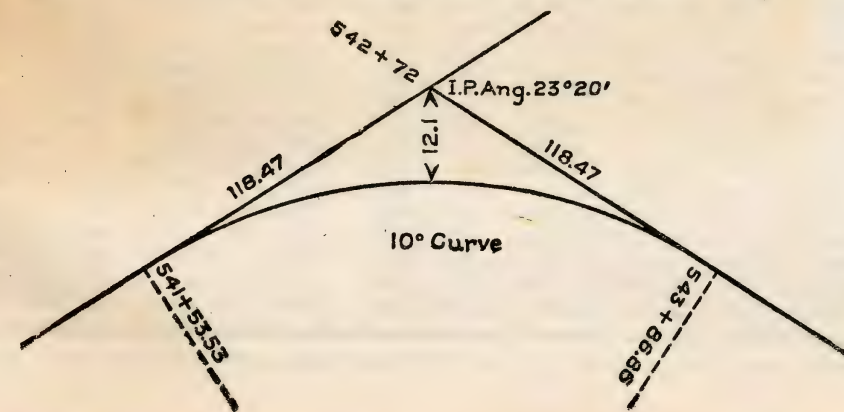


TABLE I. — Minutes in Decimals of a Degree.

1'	.0167	11'	.1833	21'	.3500	31'	.5167	41'	.6833	51'	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

TABLE II. — Inches in Decimals of a Foot.

1-16	3-32	1/8	3-16	1/4	5-16	3/8	1/2	5/8	3/4	7/8
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729
1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

TABLE III. — Radii, Ordinates and Deflections.

Deg.	Radius	Mid. Ord.	Tan. Def.	Chd. Def.	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan. Def.	Chd. Def.	Def. for 1 Foot
0° 10'	34377.	.036	.145	.291	0.05'	7°	819.0	1.528	6.105	12.21	2.10'
20	17189.	.073	.291	.582	0.10	20	781.8	1.600	6.395	12.79	2.20
30	11459.	.109	.436	.873	0.15	30	764.5	1.637	6.540	13.08	2.25
40	8594.4	.145	.582	1.164	0.20	40	747.9	1.673	6.685	13.37	2.30
50	6875.5	.182	.727	1.454	0.25	50	716.8	1.746	6.976	13.95	2.40
1 10	5729.6	.218	.873	1.745	0.30	60	688.2	1.819	7.266	14.53	2.50
20	4911.2	.255	1.018	2.036	0.35	70	674.7	1.855	7.411	14.82	2.55
30	4297.3	.291	1.164	2.327	0.40	80	661.7	1.892	7.556	15.11	2.60
40	3819.8	.327	1.309	2.618	0.45	90	637.3	1.965	7.846	15.69	2.70
50	3437.9	.364	1.454	2.909	0.50	100	614.6	2.037	8.136	16.27	2.80
1 20	3125.4	.400	1.600	3.200	0.55	110	603.8	2.074	8.281	16.56	2.85
30	2864.9	.436	1.745	3.490	0.60	120	593.4	2.110	8.426	16.85	2.90
40	2644.6	.473	1.891	3.781	0.65	130	573.7	2.183	8.716	17.43	3.00
50	2455.7	.509	2.036	4.072	0.70	140	546.4	2.292	9.150	18.30	3.15
1 30	2292.0	.545	2.181	4.363	0.75	150	521.7	2.402	9.585	19.16	3.30
40	2148.8	.582	2.327	4.654	0.80	160	499.1	2.511	10.02	20.04	3.45
50	2022.4	.618	2.472	4.945	0.85	170	478.3	2.620	10.45	20.91	3.60
1 40	1910.1	.655	2.618	5.235	0.90	180	459.3	2.730	10.89	21.77	3.75
20	1809.6	.691	2.763	5.526	0.95	190	441.7	2.839	11.32	22.64	3.90
30	1719.1	.727	2.908	5.817	1.00	200	425.4	2.949	11.75	23.51	4.05
40	1637.3	.764	3.054	6.108	1.05	210	410.3	3.058	12.18	24.37	4.20
50	1562.9	.800	3.199	6.398	1.10	220	396.2	3.168	12.62	25.24	4.35
1 50	1495.0	.836	3.345	6.689	1.15	230	383.1	3.277	13.05	26.11	4.50
20	1432.7	.873	3.490	6.980	1.20	240	370.8	3.387	13.49	26.97	4.65
30	1375.4	.909	3.635	7.271	1.25	250	359.3	3.496	13.92	27.84	4.80
40	1322.5	.945	3.781	7.561	1.30	260	348.5	3.606	14.35	28.70	4.95
50	1273.6	.982	3.926	7.852	1.35	270	338.3	3.716	14.78	29.56	5.10
1 60	1228.1	1.018	4.071	8.143	1.40	280	319.6	3.935	15.64	31.29	5.40
20	1185.8	1.055	4.217	8.433	1.45	290	302.9	4.155	16.51	33.01	5.70
30	1146.3	1.091	4.362	8.724	1.50	300	287.9	4.374	17.37	34.73	6.00
40	1109.3	1.127	4.507	9.014	1.55	310	274.4	4.594	18.22	36.44	6.30
50	1074.7	1.164	4.653	9.305	1.60	320	262.0	4.814	19.08	38.16	6.60
1 70	1042.1	1.200	4.798	9.596	1.65	330	250.8	5.035	19.94	39.87	6.90
20	1011.5	1.237	4.943	9.886	1.70	340	240.5	5.255	20.79	41.58	7.20
30	982.6	1.273	5.088	10.18	1.75	350	231.0	5.476	21.64	43.28	7.50
40	955.4	1.309	5.234	10.47	1.80	360	222.3	5.697	22.50	44.99	7.80
50	929.6	1.346	5.379	10.76	1.85	370	214.2	5.918	23.35	46.69	8.10
1 80	905.1	1.382	5.524	11.05	1.90	380	206.7	6.139	24.19	48.38	8.40
20	881.9	1.418	5.669	11.34	1.95	390	199.7	6.360	25.04	50.07	8.70
30	859.9	1.455	5.814	11.63	2.00	400	193.2	6.583	25.88	51.76	9.00

TABLE IV. — Tangents and Externals to a 1° Curve.

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
1°	50.00	.22	11°	551.70	26.50	21°	1061.9	97.57
10'	58.34	.30	10'	560.11	27.31	10'	1070.6	99.16
20	66.67	.39	20	568.53	28.14	20	1079.2	100.75
30	75.01	.49	30	576.95	28.97	30	1087.8	102.35
40	83.34	.61	40	585.36	29.82	40	1096.4	103.97
50	91.68	.73	50	593.79	30.68	50	1105.1	105.60
2	100.01	.87	12	602.21	31.56	22	1113.7	107.24
10	108.35	1.02	10	610.64	32.45	10	1122.4	108.90
20	116.68	1.19	20	619.07	33.35	20	1131.0	110.57
30	125.02	1.36	30	627.50	34.26	30	1139.7	112.25
40	133.36	1.55	40	635.93	35.18	40	1148.4	113.95
50	141.70	1.75	50	644.37	36.12	50	1157.0	115.66
3	150.04	1.96	13	652.81	37.07	23	1165.7	117.38
10	158.38	2.19	10	661.25	38.03	10	1174.4	119.12
20	166.72	2.43	20	669.70	39.01	20	1183.1	120.87
30	175.06	2.67	30	678.15	39.99	30	1191.8	122.63
40	183.40	2.93	40	686.60	40.99	40	1200.5	124.41
50	191.74	3.21	50	695.06	42.00	50	1209.2	126.20
4	200.08	3.49	14	703.51	43.03	24	1217.9	128.00
10	208.43	3.79	10	711.97	44.07	10	1226.6	129.82
20	216.77	4.10	20	720.44	45.12	20	1235.3	131.65
30	225.12	4.42	30	728.90	46.18	30	1244.0	133.50
40	233.47	4.76	40	737.37	47.25	40	1252.8	135.35
50	241.81	5.10	50	745.85	48.34	50	1261.5	137.23
5	250.16	5.46	15	754.32	49.44	25	1270.2	139.11
10	258.51	5.83	10	762.80	50.55	10	1279.0	141.01
20	266.86	6.21	20	771.29	51.68	20	1287.7	142.93
30	275.21	6.61	30	779.77	52.89	30	1296.5	144.85
40	283.57	7.01	40	788.26	53.97	40	1305.3	146.79
50	291.92	7.43	50	796.75	55.13	50	1314.0	148.75
6	300.28	7.86	16	805.25	56.31	26	1322.8	150.71
10	308.64	8.31	10	813.75	57.50	10	1331.6	152.69
20	316.99	8.76	20	822.25	58.70	20	1340.4	154.69
30	325.35	9.23	30	830.76	59.91	30	1349.2	156.70
40	333.71	9.71	40	839.27	61.14	40	1358.0	158.72
50	342.08	10.20	50	847.78	62.38	50	1366.8	160.76
7	350.44	10.71	17	856.30	63.63	27	1375.6	162.81
10	358.81	11.22	10	864.82	64.90	10	1384.4	164.86
20	367.17	11.75	20	873.35	66.18	20	1393.2	166.95
30	375.54	12.29	30	881.88	67.47	30	1402.0	169.04
40	383.91	12.85	40	890.41	68.77	40	1410.9	171.15
50	392.28	13.41	50	898.95	70.09	50	1419.7	173.27
8	400.66	13.99	18	907.49	71.42	28	1428.6	175.41
10	409.03	14.58	10	916.03	72.76	10	1437.4	177.55
20	417.41	15.18	20	924.58	74.12	20	1446.3	179.72
30	425.79	15.80	30	933.13	75.49	30	1455.1	181.89
40	434.17	16.43	40	941.69	76.86	40	1464.0	184.08
50	442.55	17.07	50	950.25	78.26	50	1472.9	186.29
9	450.93	17.72	19	958.81	79.67	29	1481.8	188.51
10	459.32	18.38	10	967.38	81.09	10	1490.7	190.74
20	467.71	19.06	20	975.96	82.53	20	1499.6	192.99
30	476.10	19.75	30	984.53	83.97	30	1508.5	195.25
40	484.49	20.45	40	993.12	85.43	40	1517.4	197.53
50	492.88	21.16	50	1001.7	86.90	50	1526.3	199.82
10	501.28	21.89	20	1010.3	88.39	30	1535.3	202.12
10	509.68	22.62	10	1018.9	89.89	10	1544.2	204.44
20	518.08	23.38	20	1027.5	91.40	20	1553.1	206.77
30	526.48	24.14	30	1036.1	92.92	30	1562.1	209.12
40	534.89	24.91	40	1044.7	94.46	40	1571.0	211.48
50	543.29	25.70	50	1053.3	96.01	50	1580.0	213.86

TABLE IV. — Tangents and External to a 1° Curve.

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
31°	1589.0	216.3	41°	2142.2	387.4	51°	2732.9	618.4
10'	1598.0	218.7	10'	2151.7	390.7	10'	2743.1	622.8
20	1606.9	221.1	20	2161.2	394.1	20	2753.4	627.2
30	1615.9	223.5	30	2170.8	397.4	30	2763.7	631.7
40	1624.9	226.0	40	2180.3	400.8	40	2773.9	636.2
50	1633.9	228.4	50	2189.9	404.2	50	2784.2	640.7
32	1643.0	230.9	42	2199.4	407.6	52	2794.5	645.2
10	1652.0	233.4	10	2209.0	411.1	10	2804.9	649.7
20	1661.0	235.9	20	2218.6	414.5	20	2815.2	654.3
30	1670.0	238.4	30	2228.1	418.0	30	2825.6	658.8
40	1679.1	241.0	40	2237.7	421.4	40	2835.9	663.4
50	1688.1	243.5	50	2247.3	425.0	50	2846.3	668.0
33	1697.2	246.1	43	2257.0	428.5	53	2856.7	672.7
10	1706.3	248.7	10	2266.6	432.0	10	2867.1	677.3
20	1715.3	251.3	20	2276.2	435.6	20	2877.5	682.0
30	1724.4	253.9	30	2285.9	439.2	30	2888.0	686.7
40	1733.5	256.5	40	2295.6	442.8	40	2898.4	691.4
50	1742.6	259.1	50	2305.2	446.4	50	2908.9	696.1
34	1751.7	261.8	44	2314.9	450.0	54	2919.4	700.9
10	1760.8	264.5	10	2324.6	453.6	10	2929.9	705.7
20	1770.0	267.2	20	2334.3	457.3	20	2940.4	710.5
30	1779.1	269.9	30	2344.1	461.0	30	2951.0	715.3
40	1788.2	272.6	40	2353.8	464.6	40	2961.5	720.1
50	1797.4	275.3	50	2363.5	468.4	50	2972.1	725.0
35	1806.6	278.1	45	2373.3	472.1	55	2982.7	729.9
10	1815.7	280.8	10	2383.1	475.8	10	2993.3	734.8
20	1824.9	283.6	20	2392.8	479.6	20	3003.9	739.7
30	1834.1	286.4	30	2402.6	483.8	30	3014.5	744.6
40	1843.3	289.2	40	2412.4	487.2	40	3025.2	749.6
50	1852.5	292.0	50	2422.3	491.0	50	3035.8	754.6
36	1861.7	294.9	46	2432.1	494.8	56	3046.5	759.6
10	1870.9	297.7	10	2441.9	498.7	10	3057.2	764.6
20	1880.1	300.6	20	2451.8	502.5	20	3067.9	769.7
30	1889.4	303.5	30	2461.7	506.4	30	3078.7	774.7
40	1898.6	306.4	40	2471.5	510.3	40	3089.4	779.8
50	1907.9	309.3	50	2481.4	514.3	50	3100.2	784.9
37	1917.1	312.2	47	2491.3	518.2	57	3110.9	790.1
10	1926.4	315.2	10	2501.2	522.2	10	3121.7	795.2
20	1935.7	318.1	20	2511.2	526.1	20	3132.6	800.4
30	1945.0	321.1	30	2521.1	530.1	30	3143.4	805.6
40	1954.3	324.1	40	2531.1	534.2	40	3154.2	810.9
50	1963.6	327.1	50	2541.0	538.2	50	3165.1	816.1
38	1972.9	330.2	48	2551.0	542.2	58	3176.0	821.4
10	1982.2	333.2	10	2561.0	546.3	10	3186.9	826.7
20	1991.5	336.3	20	2571.0	550.4	20	3197.8	832.0
30	2000.9	339.3	30	2581.0	554.5	30	3208.8	837.3
40	2010.2	342.4	40	2591.0	558.6	40	3219.7	842.7
50	2019.6	345.5	50	2601.1	562.8	50	3230.7	848.1
39	2029.0	348.6	49	2611.2	566.9	59	3241.7	853.5
10	2038.4	351.8	10	2621.2	571.1	10	3252.7	858.9
20	2047.8	354.9	20	2631.3	575.3	20	3263.7	864.3
30	2057.2	358.1	30	2641.4	579.5	30	3274.8	869.8
40	2066.6	361.3	40	2651.5	583.8	40	3285.8	875.3
50	2076.0	364.5	50	2661.6	588.0	50	3296.9	880.8
40	2085.4	367.7	50	2671.8	592.3	60	3308.0	886.4
10	2094.9	371.0	10	2681.9	596.6	10	3319.1	892.0
20	2104.3	374.2	20	2692.1	600.9	20	3330.3	897.5
30	2113.8	377.5	30	2702.3	605.3	30	3341.4	903.2
40	2123.3	380.8	40	2712.5	609.6	40	3352.6	908.8
50	2132.7	384.1	50	2722.7	614.0	50	3363.8	914.5

TABLE IV. — Tangents and External to a 1° Curve.

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
61°	3375.0	920.2	71°	4086.9	1308.2	81°	4893.6	1805.3
10'	3386.3	925.9	10'	4099.5	1315.6	10'	4908.0	1814.7
20	3397.5	931.6	20	4112.1	1322.9	20	4922.5	1824.1
30	3408.8	937.3	30	4124.8	1330.3	30	4937.0	1833.6
40	3420.1	943.1	40	4137.4	1337.7	40	4951.5	1843.1
50	3431.4	948.9	50	4150.1	1345.1	50	4966.1	1852.6
62	3442.7	954.8	72	4162.8	1352.6	82	4980.7	1862.2
10	3454.1	960.6	10	4175.6	1360.1	10	4995.4	1871.8
20	3465.4	966.5	20	4188.5	1367.6	20	5010.0	1881.5
30	3476.8	972.4	30	4201.2	1375.2	30	5024.8	1891.2
40	3488.3	978.3	40	4214.0	1382.8	40	5039.5	1900.9
50	3499.7	984.3	50	4226.8	1390.4	50	5054.3	1910.7
63	3511.1	990.2	73	4239.7	1398.0	83	5069.2	1920.5
10	3522.6	996.2	10	4252.6	1405.7	10	5084.0	1930.4
20	3534.1	1002.3	20	4265.6	1413.5	20	5099.0	1940.2
30	3545.6	1008.3	30	4278.5	1421.2	30	5113.9	1950.3
40	3557.2	1014.4	40	4291.5	1429.0	40	5128.9	1960.2
50	3568.7	1020.5	50	4304.6	1436.8	50	5143.9	1970.3
64	3580.3	1026.6	74	4317.6	1444.6	84	5159.0	1980.4
10	3591.9	1032.8	10	4330.7	1452.5	10	5174.1	1990.5
20	3603.5	1039.0	20	4343.8	1460.4	20	5189.3	2000.6
30	3615.1	1045.2	30	4356.9	1468.4	30	5204.4	2010.8
40	3626.8	1051.4	40	4370.1	1476.4	40	5219.7	2021.1
50	3638.5	1057.7	50	4383.3	1484.4	50	5234.9	2031.4
65	3650.2	1063.9	75	4396.5	1492.4	85	5250.3	2041.7
10	3661.9	1070.2	10	4409.8	1500.5	10	5265.6	2052.1
20	3673.7	1076.6	20	4423.1	1508.6	20	5281.0	2062.5
30	3685.4	1082.9	30	4436.4	1516.7	30	5296.4	2073.0
40	3697.2	1089.3	40	4449.7	1524.9	40	5311.9	2083.5
50	3709.0	1095.7	50	4463.1	1533.1	50	5327.4	2094.1
66	3720.9	1102.2	76	4476.5	1541.4	86	5343.0	2104.7
10	3732.7	1108.6	10	4489.9	1549.7	10	5358.6	2115.3
20	3744.6	1115.1	20	4503.4	1558.0	20	5374.2	2126.0
30	3756.5	1121.7	30	4516.9	1566.3	30	5389.9	2136.7
40	3768.5	1128.2	40	4530.4	1574.7	40	5405.6	2147.5
50	3780.4	1134.8	50	4544.0	1583.1	50	5421.4	2158.4
67	3792.4	1141.4	77	4557.6	1591.6	87	5437.2	2169.2
10	3804.4	1148.0	10	4571.2	1600.1	10	5453.1	2180.2
20	3816.4	1154.7	20	4584.8	1608.6	20	5469.0	2191.1
30	3828.4	1161.3	30	4598.5	1617.1	30	5484.9	2202.2
40	3840.5	1168.1	40	4612.2	1625.7	40	5500.9	2213.2
50	3852.6	1174.8	50	4626.0	1634.4	50	5517.0	2224.3
68	3864.7	1181.6	78	4639.8	1643.0	88	5533.1	2235.5
10	3876.8	1188.4	10	4653.6	1651.7	10	5549.2	2246.7
20	3889.0	1195.2	20	4667.4	1660.5	20	5565.4	2258.0
30	3901.2	1202.0	30	4681.3	1669.2	30	5581.6	2269.3
40	3913.4	1208.9	40	4695.2	1678.1	40	5597.8	2280.6
50	3925.6	1215.8	50	4709.2	1686.9	50	5614.2	2292.0
69	3937.9	1222.7	79	4723.2	1695.8	89	5630.5	2303.5
10	3950.2	1229.7	10	4737.2	1704.7	10	5646.9	2315.0
20	3962.5	1236.7	20	4751.2	1713.7	20	5663.4	2326.6
30	3974.8	1243.7	30	4765.3	1722.7	30	5679.9	2338.2
40	3987.2	1250.8	40	4779.4	1731.7	40	5696.4	2349.8
50	3999.5	1257.9	50	4793.6	1740.8	50	5713.0	2361.5
70	4011.9	1265.0	80	4807.7	1749.9	90	5729.7	2373.3
10	4024.4	1272.1	10	4822.0	1759.0	10	5746.3	2385.1
20	4036.8	1279.3	20	4836.2	1768.2	20	5763.1	2397.0
30	4049.3	1286.5	30	4850.5	1777.4	30	5779.9	2408.9
40	4061.8	1293.6	40	4864.8	1786.7	40	5796.7	2420.9
50	4074.4	1300.9	50	4879.2	1796.0	50	5813.6	2432.9

TABLE IV. — Tangents and External to a 1° Curve.

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
91°	5830.5	2444.9	101°	6950.6	3278.1	111°	8336.7	4386.1
10'	5847.5	2457.1	10'	6971.3	3294.1	10'	8362.7	4407.6
20	5864.6	2469.3	20	6992.0	3310.1	20	8388.9	4429.2
30	5881.7	2481.5	30	7012.7	3326.1	20	8415.1	4450.9
40	5898.8	2493.8	40	7033.6	3342.3	40	8441.5	4472.7
50	5916.0	2506.1	50	7054.5	3358.5	50	8468.0	4494.6
92	5933.2	2518.5	102	7075.5	3374.9	112	8494.6	4516.6
10	5950.5	2531.0	10	7096.6	3391.2	10	8521.3	4538.8
20	5967.9	2543.5	20	7117.8	3407.7	20	8548.1	4561.1
30	5985.3	2556.0	30	7139.0	3424.3	30	8575.0	4583.4
40	6002.7	2568.6	40	7160.3	3440.9	40	8602.1	4606.0
50	6020.2	2581.3	50	7181.7	3457.6	50	8629.3	4628.6
93	6037.8	2594.0	103	7203.2	3474.4	113	8656.6	4651.3
10	6055.4	2606.8	10	7224.7	3491.3	10	8684.0	4674.2
20	6073.1	2619.7	20	7246.3	3508.2	20	8711.5	4697.2
30	6090.8	2632.6	30	7268.0	3525.2	30	8739.2	4720.3
40	6108.6	2645.5	40	7289.8	3542.4	40	8767.0	4743.6
50	6126.4	2658.5	50	7311.7	3559.6	50	8794.9	4766.9
94	6144.3	2671.6	104	7333.6	3576.8	114	8822.9	4790.4
10	6162.6	2684.7	10	7355.6	3594.2	10	8851.0	4814.1
20	6180.2	2697.9	20	7377.8	3611.7	20	8879.3	4837.8
30	6198.3	2711.2	30	7399.9	3629.2	30	8907.7	4861.7
40	6216.4	2724.5	40	7422.2	3646.8	40	8936.3	4885.7
50	6234.6	2737.9	50	7444.6	3664.5	50	8965.0	4909.9
95	6252.8	2751.3	105	7467.0	3682.3	115	8993.8	4934.1
10	6271.1	2764.8	10	7489.6	3700.2	10	9022.7	4958.6
20	6289.4	2778.3	20	7512.2	3718.2	20	9051.7	4983.1
30	6307.9	2792.0	30	7534.9	3736.2	30	9080.9	5007.8
40	6326.3	2805.6	40	7557.7	3754.4	40	9110.3	5032.6
50	6344.8	2819.4	50	7580.5	3772.6	50	9139.8	5057.6
96	6363.4	2833.2	106	7603.5	3791.0	116	9169.4	5082.7
10	6382.1	2847.0	10	7626.6	3809.4	10	9199.1	5107.9
20	6400.8	2861.0	20	7649.7	3827.9	20	9229.0	5133.3
30	6419.5	2875.0	30	7672.9	3846.5	30	9259.0	5158.8
40	6438.4	2889.0	40	7696.3	3865.2	40	9289.2	5184.5
50	6457.3	2903.1	50	7719.7	3884.0	50	9319.5	5210.3
97	6476.2	2917.3	107	7743.2	3902.9	117	9349.9	5236.2
10	6495.2	2931.6	10	7766.8	3921.9	10	9380.5	5262.3
20	6514.3	2945.9	20	7790.5	3940.9	20	9411.3	5288.6
30	6533.4	2960.3	30	7814.3	3960.1	30	9442.2	5315.0
40	6552.6	2974.7	40	7838.1	3979.4	40	9473.2	5341.5
50	6571.9	2989.2	50	7862.1	3998.7	50	9504.4	5368.2
98	6591.2	3003.8	108	7886.2	4018.2	118	9535.7	5395.1
10	6610.6	3018.4	10	7910.4	4037.8	10	9567.2	5422.1
20	6630.1	3033.1	20	7934.6	4057.4	20	9598.9	5449.2
30	6649.6	3047.9	30	7959.0	4077.2	30	9630.7	5476.5
40	6669.2	3062.8	40	7983.5	4097.1	40	9662.6	5504.0
50	6688.8	3077.7	50	8008.0	4117.0	50	9694.7	5531.7
99	6708.6	3092.7	109	8032.7	4137.1	119	9727.0	5559.4
10	6728.4	3107.7	10	8057.4	4157.3	10	9759.4	5587.4
20	6748.2	3122.9	20	8082.3	4177.5	20	9792.0	5615.5
30	6768.1	3138.1	30	8107.3	4197.9	30	9824.8	5643.8
40	6788.1	3153.3	40	8132.3	4218.4	40	9857.7	5672.3
50	6808.2	3168.7	50	8157.5	4239.0	50	9890.8	5700.9
100	6828.3	3184.1	110	8182.8	4259.7	120	9924.0	5729.7
10	6848.5	3199.6	10	8208.2	4280.5	10	9957.5	5758.6
20	6868.8	3215.1	20	8233.7	4301.4	20	9991.0	5787.7
30	6889.2	3230.8	30	8259.3	4322.4	30	10025.0	5817.0
40	6909.6	3246.5	40	8285.0	4343.6	40	10059.0	5846.5
50	6930.1	3262.3	50	8310.8	4364.8	50	10093.0	5876.1

TABLE V. Corrections for use with Table IV.

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For Tangents Add

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.03	.06	.09	.13	.16	.19	.22	.25	.28	.31	.34	.38	.42	.46
15°	.04	.10	.14	.19	.24	.29	.34	.39	.45	.51	.53	.58	.63	.68
20°	.06	.13	.19	.26	.32	.39	.45	.51	.58	.65	.72	.79	.84	.90
25°	.08	.16	.24	.33	.40	.49	.58	.67	.75	.83	.90	.99	1.06	1.14
30°	.10	.19	.29	.39	.49	.59	.69	.79	.89	.99	1.09	1.20	1.29	1.39
35°	.11	.22	.34	.47	.58	.69	.70	.81	.92	1.04	1.29	1.42	1.54	1.66
40°	.13	.26	.40	.53	.67	.80	.93	1.06	1.20	1.34	1.49	1.64	1.79	1.94
45°	.15	.30	.44	.60	.76	.91	1.06	1.21	1.37	1.52	1.70	1.87	2.04	2.21
50°	.17	.34	.51	.68	.85	1.02	1.19	1.36	1.54	1.72	1.91	2.10	2.29	2.48
55°	.19	.38	.57	.76	.95	1.14	1.32	1.52	1.72	1.92	2.14	2.35	2.56	2.77
60°	.21	.42	.63	.84	1.05	1.27	1.49	1.71	1.94	2.17	2.38	2.60	2.83	3.07
65°	.23	.46	.69	.93	1.16	1.40	1.64	1.88	2.13	2.38	2.63	2.88	3.13	3.39
70°	.25	.51	.76	1.02	1.28	1.54	1.80	2.06	2.33	2.60	2.88	3.16	3.44	3.72
75°	.27	.56	.83	1.12	1.40	1.69	1.98	2.27	2.57	2.87	3.16	3.47	3.78	4.09
80°	.30	.61	.91	1.22	1.53	1.84	2.15	2.46	2.78	3.10	3.44	3.78	4.12	4.46
85°	.33	.66	1.00	1.33	1.68	2.02	2.36	2.70	3.05	3.40	3.77	4.14	4.55	4.89
90°	.36	.72	1.09	1.45	1.83	2.20	2.57	2.94	3.32	3.70	4.10	4.50	4.91	5.32
95°	.39	.79	1.19	1.55	2.00	2.40	2.80	3.20	3.61	4.02	4.49	4.98	5.38	5.83
100°	.43	.86	1.30	1.74	2.18	2.62	3.06	3.50	3.95	4.40	4.88	5.37	5.85	6.34

For External Add

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.001	.003	.004	.006	.007	.008	.009	.011	.012	.014	.015	.017	.018	.020
15°	.003	.007	.010	.014	.018	.023	.027	.029	.032	.035	.039	.043	.047	.051
20°	.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.076	.083
25°	.009	.018	.027	.036	.046	.056	.065	.074	.083	.093	.106	.120	.127	.135
30°	.013	.025	.038	.051	.065	.078	.090	.103	.116	.129	.149	.170	.179	.188
35°	.018	.035	.054	.072	.086	.109	.131	.153	.175	.197	.213	.230	.247	.264
40°	.023	.046	.070	.093	.117	.141	.172	.203	.234	.265	.277	.290	.315	.341
45°	.030	.060	.093	.119	.153	.184	.216	.254	.289	.325	.351	.378	.411	.445
50°	.037	.075	.116	.151	.189	.227	.266	.305	.345	.384	.425	.467	.508	.550
55°	.046	.093	.142	.188	.236	.283	.332	.381	.420	.479	.530	.582	.641	.700
60°	.056	.112	.168	.225	.283	.340	.398	.457	.516	.575	.636	.697	.774	.851
65°	.067	.135	.204	.273	.343	.412	.483	.554	.625	.697	.771	.845	.922	1.01
70°	.080	.159	.240	.321	.403	.485	.568	.652	.735	.819	.906	.994	1.08	1.17
75°	.095	.182	.286	.383	.480	.578	.678	.777	.877	.977	1.07	1.18	1.29	1.39
80°	.110	.220	.332	.445	.558	.671	.787	.903	1.02	1.13	1.25	1.38	1.50	1.62
85°	.128	.259	.391	.524	.657	.790	.926	1.06	1.20	1.34	1.47	1.62	1.76	1.91
90°	.149	.299	.450	.603	.756	.910	1.07	1.22	1.38	1.54	1.70	1.87	2.03	2.20
95°	.174	.350	.522	.706	.885	1.06	1.25	1.43	1.62	1.80	1.99	2.18	2.38	2.58
100°	.200	.401	.604	.809	1.01	1.22	1.43	1.64	1.85	2.06	2.28	2.50	2.73	2.96

TABLE VI. Deflections for Sub Chords for Short Radius Curves.

Degree of Curve	Radius 50 sin. def. ang.	$\frac{1}{2}$ sub chord R = sin of def. angle				Length of arc for 100 ft.
		12.5 Ft.	15 Ft.	20 Ft.	25 Ft.	
30°	193.18	1° 51'	2° 17'	2° 58'	3° 43'	101.15
32°	181.39	1° 59'	2° 25'	3° 19'	3° 58'	101.33
34°	171.01	2° 06'	2° 33'	3° 21'	4° 12'	101.48
36°	161.80	2° 13'	2° 41'	3° 33'	4° 26'	101.66
38°	153.58	2° 20'	2° 49'	3° 44'	4° 40'	101.85
40°	146.19	2° 27'	2° 57'	3° 55'	4° 54'	102.06
42°	139.52	2° 34'	3° 05'	4° 07'	5° 08'	102.29
44°	133.47	2° 41'	3° 13'	4° 18'	5° 22'	102.53
46°	127.97	2° 48'	3° 21'	4° 29'	5° 36'	102.76
48°	122.92	2° 55'	3° 29'	4° 40'	5° 50'	103.00
50°	118.31	3° 02'	3° 38'	4° 51'	6° 04'	103.24
52°	114.06	3° 09'	3° 46'	5° 02'	6° 17'	103.54
54°	110.11	3° 16'	3° 54'	5° 13'	6° 31'	103.84
56°	106.50	3° 22'	4° 02'	5° 23'	6° 44'	104.14
58°	103.14	3° 29'	4° 10'	5° 34'	6° 57'	104.43
60°	100.00	3° 35'	4° 18'	5° 44'	7° 11'	104.72

$$T = R \tan \frac{1}{2} I$$

$$T = \frac{50 \tan \frac{1}{2} I}{\sin. D}$$

$$\sin. D = \frac{50}{R}$$

$$\sin. D = \frac{50 \tan \frac{1}{2} I}{T}$$

CURVE FORMULAS

$$R = T \cot. \frac{1}{2} I$$

$$R = \frac{50}{\sin. D}$$

$$E = R \text{ ex. sec } \frac{1}{2} I$$

$$E = T \tan \frac{1}{4} I$$

$$\text{Chord def.} = \frac{\text{chord}^2}{R}$$

$$\text{No. chords} = \frac{\frac{1}{2} I}{D}$$

$$\text{Tan. def.} = \frac{1}{2} \text{ chord def.}$$

The square of any distance, divided by twice the radius, will equal the distance from tangent to curve, very nearly.

Table IV. contains Tangents and Externals to a 1° curve. Tan. and Ext. to any other radius may be found nearly enough, by dividing the Tan. or Ext. opposite the given Central Angle by the given degree of curve.

To find Deg. of Curve, having the Central Angle and Tangent: Divide Tan. opposite the given Central Angle by the given Tangent.

To find Deg. of Curve, having the Central Angle and Tangent: Divide Ext. opposite the given Central Angle by the given External.

To find Nat. Tan. and Nat. Ex. Sec. for any angle by Table IV.: Tan. or Ext. of twice the given angle divided by the radius of a 1° curve will be the Nat. Tan. or Nat. Ex. Sec.

To find angle for a given distance and deflection.

Rule 1. Multiply the given distance by .01745 (def. for 1° for 1 ft.), and divide given deflection by the product.

Rule 2. Multiply given deflection by 57.3, and divide the product by the given distance.

To find deflection for a given angle and distance. Multiply the angle by .01745, and the product by the distance.

RIGHT ANGLE TRIANGLES. Square the altitude, divide by twice the base. Add quotient to base for hypotenuse.

Given Base 100, Alt. 10 $10^2 \div 200 = .5$. $100 + .5 = 100.5$ hyp.

Given Hyp. 100, Alt. 25 $25^2 \div 200 = 3.125$. $100 - 3.125 = 96.875 = \text{Base}$.

Error in first example, .002; in last, .045.

To find Tons of Rail in one mile of track: multiply weight per yard by 11, and divide by 7.

Natural Sines

Deg.	0'	10'	20'	30'	40'	50'	dg.	dg.	0'	10'	20'	30'	40'	50'	Deg.
0	0000	0029	0058	0087	0116	0145	89	40	6428	6450	6472	6494	6517	6539	49
1	0175	0204	0233	0262	0291	0320	88	41	6561	6583	6604	6626	6648	6670	48
2	0349	0378	0407	0436	0465	0494	87	42	6691	6713	6734	6756	6777	6799	47
3	0523	0552	0581	0610	0640	0669	86	43	6820	6841	6862	6884	6905	6926	46
4	0698	0727	0756	0785	0814	0843	85	44	6947	6967	6988	7009	7030	7050	45
5	0872	0901	0929	0958	0987	1016	84	45	7071	7092	7112	7133	7153	7173	44
6	1045	1074	1103	1132	1161	1190	83	46	7193	7214	7234	7254	7274	7294	43
7	1219	1248	1279	1305	1334	1363	82	47	7314	7333	7353	7373	7392	7412	42
8	1392	1421	1449	1478	1507	1536	81	48	7431	7451	7470	7490	7509	7528	41
9	1564	1593	1622	1650	1679	1708	80	49	7547	7566	7585	7604	7623	7642	40
10	1736	1765	1794	1822	1851	1880	79	50	7660	7679	7698	7716	7735	7753	39
11	1908	1937	1965	1994	2022	2051	78	51	7771	7790	7808	7826	7844	7862	38
12	2079	2108	2136	2164	2193	2221	77	52	7880	7898	7916	7934	7951	7969	37
13	2250	2278	2306	2334	2363	2391	76	53	7986	8004	8021	8039	8056	8073	36
14	2419	2447	2476	2504	2532	2560	75	54	8090	8107	8124	8141	8158	8175	35
15	2588	2616	2644	2672	2700	2728	74	55	8192	8208	8225	8241	8258	8274	34
16	2756	2784	2812	2840	2868	2896	73	56	8290	8307	8323	8339	8355	8371	33
17	2924	2952	2979	3007	3035	3062	72	57	8387	8403	8418	8434	8450	8465	32
18	3090	3118	3145	3173	3201	3228	71	58	8480	8496	8511	8526	8542	8557	31
19	3256	3283	3311	3338	3365	3393	70	59	8572	8587	8601	8616	8631	8646	30
20	3420	3448	3475	3502	3529	3557	69	60	8660	8675	8689	8704	8718	8732	29
21	3584	3611	3638	3665	3692	3719	68	61	8746	8760	8774	8788	8802	8816	28
22	3746	3773	3800	3827	3854	3881	67	62	8829	8843	8857	8870	8884	8897	27
23	3907	3934	3961	3987	4014	4041	66	63	8910	8923	8936	8949	8962	8975	26
24	4067	4094	4120	4147	4173	4200	65	64	8988	9001	9013	9026	9038	9051	25
25	4226	4253	4279	4305	4331	4358	64	65	9063	9075	9088	9100	9112	9124	24
26	4384	4410	4436	4462	4488	4514	63	66	9135	9147	9159	9171	9182	9194	23
27	4540	4566	4592	4617	4643	4669	62	67	9205	9216	9228	9239	9250	9261	22
28	4695	4720	4746	4772	4797	4823	61	68	9272	9283	9293	9304	9315	9325	21
29	4848	4874	4899	4924	4950	4975	60	69	9336	9346	9356	9367	9377	9387	20
30	5000	5025	5050	5075	5100	5125	59	70	9397	9407	9417	9426	9436	9446	19
31	5150	5175	5200	5225	5250	5275	58	71	9455	9465	9474	9483	9492	9502	18
32	5299	5324	5348	5373	5398	5422	57	72	9511	9520	9528	9537	9546	9555	17
33	5446	5471	5495	5519	5544	5568	56	73	9563	9572	9580	9588	9596	9605	16
34	5592	5616	5640	5664	5688	5712	55	74	9613	9621	9628	9636	9644	9652	15
35	5736	5760	5783	5807	5831	5854	54	75	9659	9667	9674	9681	9689	9696	14
36	5878	5901	5925	5948	5972	5995	53	76	9703	9710	9717	9724	9730	9737	13
37	6018	6041	6065	6088	6111	6134	52	77	9744	9750	9757	9763	9769	9775	12
38	6157	6180	6202	6225	6248	6271	51	78	9781	9787	9793	9799	9805	9811	11
39	6293	6316	6338	6361	6383	6406	50	79	9816	9822	9827	9833	9838	9843	10

Deg.	0'	10'	20'	30'	40'	50'	Deg.
80	9848	9853	9858	9863	9868	9872	9
81	9877	9881	9886	9890	9894	9899	8
82	9903	9907	9911	9914	9918	9922	7
83	9925	9929	9932	9936	9939	9942	6
84	9945	9948	9951	9954	9957	9959	5
85	9962	9964	9967	9969	9971	9974	4
86	9976	9978	9980	9981	9983	9985	3
87	9986	9988	9989	9990	9992	9993	2
88	9994	9995	9996	9997	9997	9998	1
89	9998	9999	9999	9999	1.0000	1.0000	0
Deg.	60'	50'	40'	30'	20'	10'	Deg.

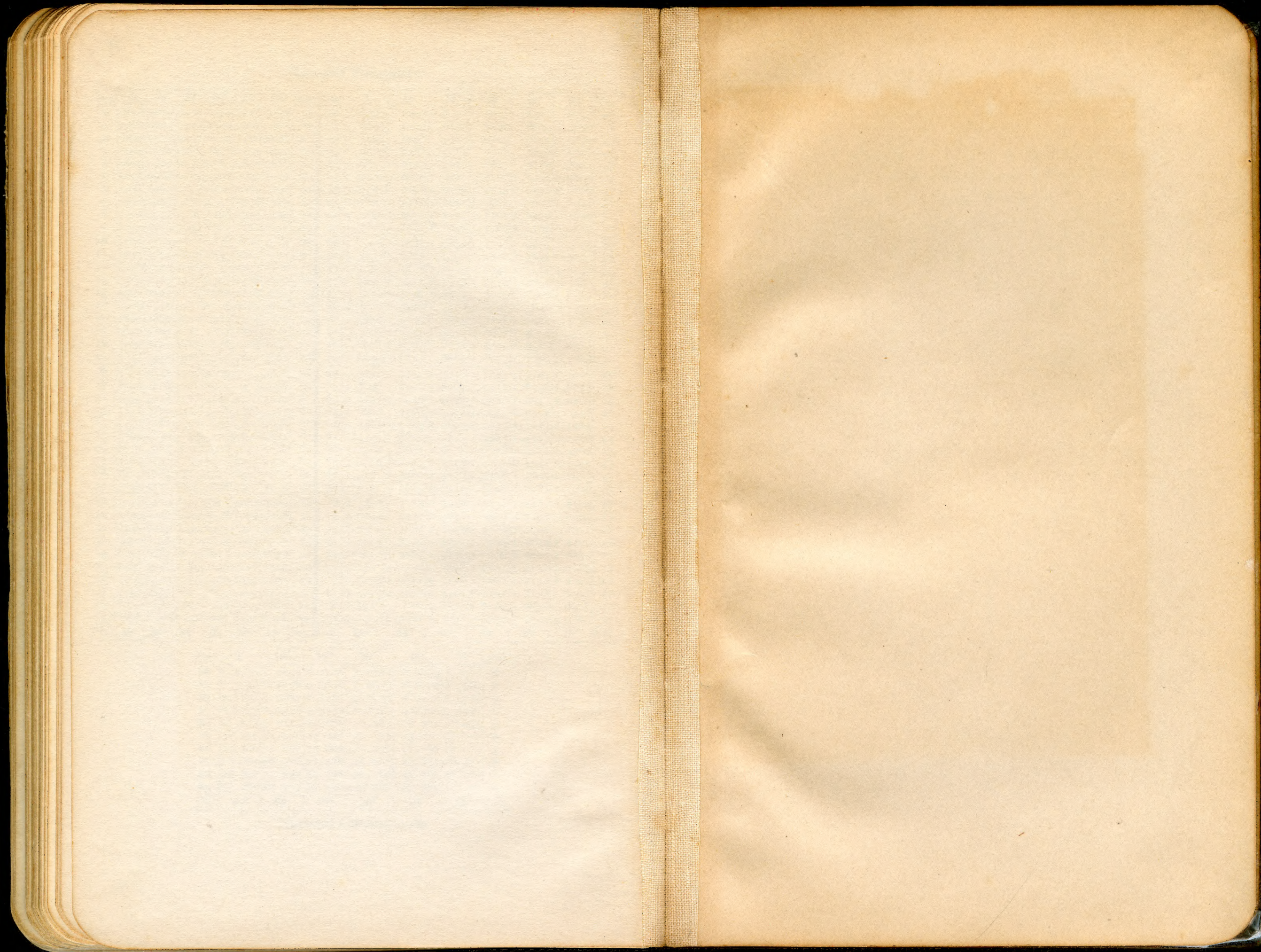
Natural Cosines

Natural Tangents.

Deg.	0'	10'	20'	30'	40'	50'	Deg.	Deg.	0'	10'	20'	30'	40'	50'	Deg.
0	0000	0029	0058	0087	0116	0145	89	40	8391	8441	8491	8541	8591	8642	49
1	0175	0204	0233	0262	0291	0320	88	41	8693	8744	8796	8847	8899	8952	48
2	0349	0378	0407	0437	0466	0495	87	42	9004	9057	9110	9163	9217	9271	47
3	0524	0553	0582	0612	0641	0670	86	43	9325	9380	9435	9490	9545	9601	46
4	0699	0729	0758	0787	0816	0846	85	44	9657	9713	9770	9827	9884	9942	45
5	0875	0904	0934	0963	0992	1022	84	45	1.0000	1.0058	1.0117	1.0176	1.0235	1.0295	44
6	1051	1080	1110	1139	1169	1198	83	46	1.0355	1.0416	1.0477	1.0533	1.0599	1.0661	43
7	1228	1257	1287	1317	1346	1376	82	47	1.0724	1.0786	1.0850	1.0913	1.0977	1.1041	42
8	1405	1435	1465	1495	1524	1554	81	48	1.1106	1.1171	1.1237	1.1303	1.1369	1.1436	41
9	1584	1614	1644	1673	1703	1733	80	49	1.1504	1.1571	1.1640	1.1708	1.1778	1.1847	40
10	1763	1793	1823	1853	1883	1914	79	50	1.1918	1.1988	1.2059	1.2131	1.2203	1.2276	39
11	1944	1974	2004	2035	2065	2095	78	51	1.2349	1.2423	1.2497	1.2572	1.2647	1.2723	38
12	2126	2156	2186	2217	2247	2278	77	52	1.2799	1.2876	1.2954	1.3032	1.3111	1.3190	37
13	2309	2339	2370	2401	2432	2462	76	53	1.3270	1.3351	1.3432	1.3514	1.3597	1.3680	36
14	2493	2524	2555	2586	2617	2648	75	54	1.3764	1.3848	1.3934	1.4019	1.4106	1.4193	35
15	2679	2711	2742	2773	2805	2836	74	55	1.4281	1.4370	1.4460	1.4550	1.4641	1.4733	34
16	2867	2899	2931	2962	2994	3026	73	56	1.4826	1.4919	1.5013	1.5108	1.5204	1.5301	33
17	3057	3089	3121	3153	3185	3217	72	57	1.5399	1.5497	1.5597	1.5697	1.5798	1.5900	32
18	3249	3281	3314	3346	3378	3411	71	58	1.6003	1.6107	1.6212	1.6319	1.6426	1.6534	31
19	3443	3476	3508	3541	3574	3607	70	59	1.6643	1.6753	1.6864	1.6977	1.7090	1.7205	30
20	3640	3673	3706	3739	3772	3805	69	60	1.7321	1.7437	1.7556	1.7675	1.7797	1.7917	29
21	3839	3872	3906	3939	3973	4006	68	61	1.8040	1.8165	1.8291	1.8418	1.8546	1.8676	28
22	4040	4074	4108	4142	4176	4210	67	62	1.8807	1.8940	1.9074	1.9210	1.9347	1.9486	27
23	4245	4279	4314	4348	4383	4417	66	63	1.9626	1.9768	1.9912	2.0057	2.0204	2.0353	26
24	4452	4487	4522	4557	4592	4628	65	64	2.0503	2.0655	2.0809	2.0965	2.1123	2.1283	25
25	4663	4699	4734	4770	4806	4841	64	65	2.1445	2.1609	2.1775	2.1943	2.2113	2.2286	24
26	4877	4913	4950	4986	5022	5059	63	66	2.2460	2.2637	2.2817	2.2998	2.3183	2.3369	23
27	5095	5132	5169	5206	5243	5280	62	67	2.3559	2.3750	2.3945	2.4142	2.4342	2.4545	22
28	5317	5354	5392	5430	5467	5505	61	68	2.4751	2.4960	2.5172	2.5386	2.5605	2.5826	21
29	5543	5581	5619	5658	5696	5735	60	69	2.6051	2.6279	2.6511	2.6746	2.6985	2.7228	20
30	5774	5812	5851	5890	5930	5969	59	70	2.7475	2.7725	2.7980	2.8239	2.8502	2.8770	19
31	6009	6048	6088	6128	6168	6208	58	71	2.9042	2.9319	2.9600	2.9887	3.0178	3.0475	18
32	6249	6289	6330	6371	6412	6453	57	72	3.0777	3.1084	3.1397	3.1716	3.2041	3.2371	17
33	6494	6536	6577	6619	6661	6703	56	73	3.2709	3.3052	3.3402	3.3759	3.4124	3.4495	16
34	6745	6787	6830	6873	6916	6959	55	74	3.4874	3.5261	3.5656	3.6059	3.6470	3.6891	15
35	7002	7046	7089	7133	7177	7221	54	75	3.7321	3.7760	3.8208	3.8657	3.9136	3.9617	14
36	7265	7310	7355	7400	7445	7490	53	76	4.0108	4.0611	4.1126	4.1653	4.2193	4.2747	13
37	7536	7581	7627	7673	7720	7766	52	77	4.3315	4.3897	4.4494	4.5107	4.5736	4.6382	12
38	7813	7860	7907	7954	8002	8050	51	78	4.7046	4.7729	4.8430	4.9152	4.9894	5.0658	11
39	8098	8146	8195	8243	8292	8342	50	79	5.1446	5.2257	5.3093	5.3955	5.4845	5.5764	10
Deg.	60'	50'	40'	30'	20'	10'	Deg.	Deg.	60'	50'	40'	30'	20'	10'	Deg.

Deg.	0'	10'	20'	30'	40'	50'	Deg.
80	5.6713	5.7694	5.8708	5.9758	6.0844	6.1970	9
81	6.3138	6.4348	6.5606	6.6912	6.8269	6.9682	8
82	7.1154	7.2687	7.4287	7.5958	7.7704	7.9530	7
83	8.1443	8.3450	8.5555	8.7769	9.0098	9.2553	6
84	9.5144	9.7882	10.078	10.385	10.711	11.059	5
85	11.430	11.826	12.250	12.706	13.197	13.727	4
86	14.300	14.924	15.605	16.350	17.169	18.075	3
87	19.081	20.206	21.470	22.903	24.542	26.432	2
88	28.636	31.242	34.368	38.189	42.964	49.104	1
89	57.290	68.750	85.940	114.588	171.885	343.77	0
Deg.	60'	50'	40'	30'	20'	10'	Deg.

Natural Cotangents.



DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

ROADWAY 14 FEET WIDE. SIDE SLOPES 1½ TO 1.

FOR SINGLE TRACK EMBANKMENT.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	7.0	7.2	7.3	7.5	7.6	7.8	7.9	8.1	8.2	8.4	0
1	8.5	8.7	8.8	9.0	9.1	9.3	9.4	9.6	9.7	9.9	1
2	10.0	10.2	10.3	10.5	10.6	10.8	10.9	11.1	11.2	11.4	2
3	11.5	11.7	11.8	12.0	12.1	12.3	12.4	12.6	12.7	12.9	3
4	13.0	13.2	13.3	13.5	13.6	13.8	13.9	14.1	14.2	14.4	4
5	14.5	14.7	14.8	15.0	15.1	15.3	15.4	15.6	15.7	15.9	5
6	16.0	16.2	16.3	16.5	16.6	16.8	16.9	17.1	17.2	17.4	6
7	17.5	17.7	17.8	18.0	18.1	18.3	18.4	18.6	18.7	18.9	7
8	19.0	19.2	19.3	19.5	19.6	19.8	19.9	20.1	20.2	20.4	8
9	20.5	20.7	20.8	21.0	21.1	21.3	21.4	21.6	21.7	21.9	9
10	22.0	22.2	22.3	22.5	22.6	22.8	22.9	23.1	23.2	23.4	10
11	23.5	23.7	23.8	24.0	24.1	24.3	24.4	24.6	24.7	24.9	11
12	25.0	25.2	25.3	25.5	25.6	25.8	25.9	26.1	26.2	26.4	12
13	26.5	26.7	26.8	27.0	27.1	27.3	27.4	27.6	27.7	27.9	13
14	28.0	28.2	28.3	28.5	28.6	28.8	28.9	29.1	29.2	29.4	14
15	29.5	29.7	29.8	30.0	30.1	30.3	30.4	30.6	30.7	30.9	15
16	31.0	31.2	31.3	31.5	31.6	31.8	31.9	32.1	32.2	32.4	16
17	32.5	32.7	32.8	33.0	33.1	33.3	33.4	33.6	33.7	33.9	17
18	34.0	34.2	34.3	34.5	34.6	34.8	34.9	35.1	35.2	35.4	18
19	35.5	35.7	35.8	36.0	36.1	36.3	36.4	36.6	36.7	36.9	19
20	37.0	37.2	37.3	37.5	37.6	37.8	37.9	38.1	38.2	38.4	20
21	38.5	38.7	38.8	39.0	39.1	39.3	39.4	39.6	39.7	39.9	21
22	40.0	40.2	40.3	40.5	40.6	40.8	40.9	41.1	41.2	41.4	22
23	41.5	41.7	41.8	42.0	42.1	42.3	42.4	42.6	42.7	42.9	23
24	43.0	43.2	43.3	43.5	43.6	43.8	43.9	44.1	44.2	44.4	24
25	44.5	44.7	44.8	45.0	45.1	45.3	45.4	45.6	45.7	45.9	25
26	46.0	46.2	46.3	46.5	46.6	46.8	46.9	47.1	47.2	47.4	26
27	47.5	47.7	47.8	48.0	48.1	48.3	48.4	48.6	48.7	48.9	27
28	49.0	49.2	49.3	49.5	49.6	49.8	49.9	50.1	50.2	50.4	28
29	50.5	50.7	50.8	51.0	51.1	51.3	51.4	51.6	51.7	51.9	29
30	52.0	52.2	52.3	52.5	52.6	52.8	52.9	53.1	53.2	53.4	30
31	53.5	53.7	53.8	54.0	54.1	54.3	54.4	54.6	54.7	54.9	31
32	55.0	55.2	55.3	55.5	55.6	55.8	55.9	56.1	56.2	56.4	32
33	56.5	56.7	56.8	57.0	57.1	57.3	57.4	57.6	57.7	57.9	33
34	58.0	58.2	58.3	58.5	58.6	58.8	58.9	59.1	59.2	59.4	34
35	59.5	59.7	59.8	60.0	60.1	60.3	60.4	60.6	60.7	60.9	35
36	61.0	61.2	61.3	61.5	61.6	61.8	61.9	62.1	62.2	62.4	36

Calculated by Julien A. Hall, M. Am. Soc. C. E.

